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Draft Supplement to the Environmental Impact Statement

Long Term Special Use Authorization for Wyoming Game and Fish Commission to Use National Forest System Lands for their Winter Elk Management Activities at Alkali Creek Feedground

Draft Supplement to the Environmental Impact Statement
Long Term Special Use Authorization for Wyoming Game and Fish Commission to Use National Forest System Lands for their Winter Elk Management Programs

Teton County, Wyoming

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Abstract: *The Forest Service proposes to authorize the continued use of National Forest System lands at Alkali Creek feedground by the Wyoming Game and Fish Commission (WGFC) for facilities and feeding grounds associated with their ongoing winter elk management programs. This analysis supplements the analysis presented in a 2008 Environmental Impact Statement for Alkali Creek and five other existing feedgrounds. Changed circumstances since 2008 described in this supplement include changes in species listed as Threatened or Sensitive, designation of Wild and Scenic Rivers, impacts to the Gros Ventre Wilderness, issuance of the Pronghorn Forest Plan Amendment, effects related to recent fire activity, current information related to wildlife diseases, and effects of changes in WGFC regulations. Two alternatives were considered: No Action – No special use permit issued, and Proposed Action – special use permit issued. The Proposed Action Alternative is the Preferred Alternative.*

The DSEIS will be posted electronically at the BTNF website http://www.fs.usda.gov/projects/btnf/landmanagement/projects. Comments on this DSEIS may be posted at the BTNF website or mailed and must be received within 45 days from the date the Environmental Protection Agency Notice of Availability is published in the Federal Register. It is important the reviewers provide their comments at such times and in such a way that they are useful to the Agency's preparation of the EIS. Therefore, comments should be provided prior to the close of the comment period and should clearly articulate the reviewer's concerns and contentions. The submission of timely and specific comments can affect a reviewer's ability to participate in subsequent administrative review or judicial review.

Comments received in response to this solicitation, including names and addresses of those who comment, will be part of the public record for this proposed action. Comments submitted anonymously will be accepted and considered; however, anonymous comments will not provide the respondent with standing to participate in subsequent administrative review or judicial review.

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Executive Summary

Proposed Action

The Bridger-Teton National Forest (BTNF) received a request from the Wyoming Game and Fish Commission (WGFC) to continue to use facilities on National Forest System lands at Alkali Creek within the Jackson Ranger District to conduct their elk winter feeding and related management activities. This request was studied, along with proposals to continue similar use at other National Forest System locations, and the analysis was presented in an Environmental Impact Statement in July 2008. In the Record of Decision that accompanied that document, the Forest Supervisor stated that more information was needed before a decision could be made concerning use at Alkali Creek Feedground. Specifically, the Jackson District Ranger was directed to order a wilderness boundary survey and cooperate with the Wyoming Game and Fish Commission to perform a more detailed survey of vegetation effects inside the Gros Ventre Wilderness adjacent to the existing feedground. The Forest Supervisor stated that a decision would be made when the project record was supplemented with this additional information. This draft supplement to the environmental impact statement (DSEIS) presents that new information, along with other project-related information that has been collected since July 2008. This DSEIS also presents pertinent information from the 2008 final environmental impact statement (FEIS).

Supplemental feeding of elk (Cervus elaphus) has been conducted in northwestern Wyoming since the early 1900s. The initiation of providing supplemental feed to elk was in response to large-scale winter die-offs, which were due in part to the loss of migration routes to suitable winter range and the direct loss of winter range due to rural development and fencing (Taylor 2001). Emergency feeding was documented as early as 1907 when a Pinedale game warden provided feed for 200 snowbound elk on Willow Creek; the Supervisor of the Teton National Forest secured funds to purchase the hay (Sheldon 1927; Brown 1947). A 1939 Wyoming statute designates the Wyoming Game and Fish Commission (WGFC) liable for damages caused by big game animals. Many feedgrounds were established in the 1940s and 1950s to prevent elk from entering private lands and damaging stored crops.

The WGFC's supplemental elk feeding activity today is a daily event during the winter months at 21 feedgrounds and one staging area in western Wyoming; Alkali Creek on National Forest System land is the location of one of the WGFC feedgrounds. The U. S. Fish and Wildlife Service (USFWS) also operates a feeding program at the National Elk Refuge.

Although feedgrounds were initiated to maintain elk populations, they have become an effective tool in reducing damage to haystack yards and winter pastures on private lands (WGFD 2007) and in reducing potential of transmission of brucellosis to livestock. Elk feeding locations have been strategically placed within the BTNF and near the National Forest boundary to effectively gather elk as they transition from summer ranges down to lower elevations, mostly preventing elk migrating through private lands en route to lower elevations. Forest Service regulations require authorization for use and occupancy of National Forest System lands.

The Forest Service proposes to authorize the continued use of 91 acres of National Forest System lands at Alkali Creek Feedground by the WGFC for their winter elk management program, including one elk tagging corral, one horse corral, one tack shed, one haystack yard containing two hay sheds, a water facility, and a feeding ground. In the past the Forest Service mistakenly included an additional 14 acres of National Forest System land in the Gros Ventre Wilderness

within the feedground permit boundary. The boundary has now been clearly marked and this incursion will no longer take place.

Issues

Public scoping conducted in July of 2007, together with advice by a Forest Service interdisciplinary team, led the Forest Supervisor to identify the following issues warranting supplemental analysis:

- **Issue #1. High concentrations of elk on Alkali Creek feedground could cause soil compaction and/or increased erosion that may affect soil quality.** Alternatives are compared in this analysis describing the current percent of detrimental soil disturbance at the feedground and comparing the potential number of acres affected by alternative.
- **Issue #2. Use of Alkali Creek Feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands. These vegetation impacts could affect wilderness qualities in the Gros Ventre Wilderness, outstandingly remarkable values (ORVs) in the Gros Ventre Wild and Scenic River Corridor, and/or pronghorn migration.** Alternatives are compared in this analysis by a narrative describing the expected vegetation changes and by a comparison of acres affected by alternative.
- **Issue #3. Use of Alkali Creek Feedground concentrates the elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via sediment delivery and increased water temperatures.** Alternatives are compared in this analysis by considering the existing condition of streambanks and wetlands within and adjacent to the feedground and analysis area, then comparing the extent of stream banks and wetlands potentially affected by the alternatives.
- **Issue #4. Use of Alkali Creek Feedground could impact elk, wolves, scavengers, Canada lynx, grizzly bears, greater sage-grouse, and other wildlife species that utilize sagebrush and riparian habitat.** Alternatives are compared in this analysis by a narrative describing the expected displacement and habitat changes by alternative.

Alternatives

One alternative is the Proposed Action which would continue to authorize the facilities at Alkali Creek for WGFC's Winter Elk Management Program (Alternative 2). The other alternative is the No Action Alternative which would not authorize these facilities at Alkali Creek (Alternative 1). If facilities for elk winter management activities were no longer authorized, the WGFC would either continue to feed elk in the Gros Ventre only at Patrol Cabin and Fish Creek Feedgrounds or they would locate a new feedground on private or state land. Facilities at Alkali Creek would be removed.

Two alternatives were considered but eliminated from detailed study – eliminating elk feeding and moving Alkali Creek Feedground. Commenters asked the Forest Service to improve winter range on the BTNF, then eliminate all elk feeding and restore historical migration routes. This suggested alternative included reducing the number of elk in the herds and constructing elk-proof

fencing around affected private land. It was dismissed because the Forest Service does not have the jurisdiction to stop elk feeding. The Forest Service also considered and dismissed from detailed consideration the alternative of moving Alkali Creek Feedground to an another location to reduce effects in the Gros Ventre Wilderness. Alkali Creek Feedground was established in its current location in 1970 to reduce damage to haystack yards and winter pastures on private land and to reduce co-mingling of elk and cattle that could result in brucellosis transmission. There is no alternate location in the near vicinity suitable for elk management activities that would both reduce private land damages and have less impact on the Wilderness.

Environmental Effects

The **project area** includes the 91-acre area proposed to be permitted for Alkali Creek feedground. Environmental effects are also typically described within either the **analysis area** or the **corridor analysis area (CAA).** The **analysis area** is an area of about 3,000 acres within approximately one mile radius of the feedground boundary. The **CAA** extends from the Forest boundary near Turpin Creek up the Gros Ventre River to Fish Creek feedground and it encompasses 19,700 acres. Although most effects of herbivory associated with Alkali Creek feedground operations were localized within the **analysis area**, the **CAA** encompasses the related effects of elk that travel between feedgrounds in the Gros Ventre watershed and occasionally to the National Elk Refuge. Effects in a larger area, such as the entire Gros Ventre Watershed were considered for certain resources when identified by the interdisciplinary team specialists. Resource effects are summarized in Table E-1.

Pronghorn Migration Corridor Forest Plan Standard Consistency

The *Pronghorn Migration Forest Plan Amendment* (USFS 2008) protects the migration of pronghorn in the zone from winter range near Pinedale, Wyoming to summer range in Grand Teton National Park, Wyoming. The Alkali Creek feedground, including the area of influence by foraging elk defined by a 750 meter perimeter (WGFD 2011a), is well within the pronghorn migration corridor, however would not interfere with successful migration. The feedground facilities, collectively covering about one acre, would require migrating pronghorn to circumvent these structures when passing through the area. This impact would be minor because the feedground does not occur in a topographic bottleneck (constriction) of the migration corridor. Pronghorn encounter and routinely and successfully by-pass many anthropogenic features such as fences, highways, and housing developments during the course of their long migration to and from Pinedale.

Short-term Uses and Long-term Productivity

Continued use of National Forest System lands for WGFC's winter elk management activities affects the long-term productivity of riparian areas within the project area, analysis area, and CAA. As described in previous sections, riparian areas support a variety of wildlife [and fish] populations.

Concentrating large numbers of elk on feedgrounds could affect the rate of spread of disease, such as chronic wasting disease, if it were to become established in the analysis area. The decision to be made by the Forest Service under either alternative would have no effect on whether or not chronic wasting disease arrives in the analysis area, or the potential rate of spread of the disease, since feeding would continue with or without the use of National Forest System land.

Table E-1: Environmental Effects Summary

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
Soil Resources			
High concentrations of elk on the feedground during certain soil conditions could cause soil compaction and/or increased erosion that may affect soil quality.	Compaction and Erosion	Soil conditions would improve on the project area within 5 to 10 years but detrimental soil disturbance would likely increase on Patrol Cabin and Fish Creek feedgrounds.	Soil detrimental disturbance is 8% (moderate compaction) on 7.3 acres and is likely to remain so. Soil disturbance is not expected to exceed 15%, which is the guideline threshold when mitigation and restoration should be implemented.
	Soil Loss	No soil displacement is expected to occur as a result of stopping winter management activities at Alkali Creek feedground.	No soil displacement has been observed and is not expected to occur as a result of continuing feeding.
Vegetation Resources			
Use of Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands.	General vegetation	Ground cover would increase, vegetation diversity and shrub density would increase, and there would be fewer introductions of noxious weeds and invasive plants in the project area.	Feedground activity would result in less litter, more elk feces and unconsumed hay, less shrub densities, and more introduction and subsequent treatment of noxious weeds and invasive plants.
	Sensitive plant species - Sweet flowered rock jasmine, Starveling milkvetch, Wyoming tansymustard, Rockcress draba, Narrowleaf goldenweed, Payson's bladderpod, Creeping twinpod, Whitebark pine	No impact	No impact

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
	Sensitive plant species - Pink agoseris, Payson's milkvetch, Greenland primrose and Soft aster	May impact individuals but is not likely to cause a trend to federal listing or loss of viability.	May impact individuals but is not likely to cause a trend to federal listing or loss of viability.
	MIS plant species - Boreal draba	A more mobile elk herd would be likely trample, browse and alter boreal draba habitat.	A concentrated elk herd would be less likely trample, browse and alter boreal draba habitat.
	MIS plant species - Aspen	Aspen are preferred browse for elk. Portions of the Corridor Analysis Area would be in contradiction of the Aspen Management Guideline.	Aspen are preferred browse for elk. Portions of the project area, analysis area and Corridor Analysis Area would be in contradiction of the Aspen Management Guideline.
Hydrology Resources			
Use of the Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in willow stands associated with riparian/wetlands.	Wetlands/Riparian Areas	An improvement in riparian vegetation would occur on a 1.2 acre portion of the project area that is currently trampled during times when wetlands have bare soil exposed. There would be no notable change in willow conditions in the feedground. New elk pellet concentrations would not accumulate on-site, reducing the potential for nutrient and bacteria enrichment in the 2.9 acres of feeding area wetlands. Riparian vegetation around the wetlands	No notable impacts to willows within the feedground are currently occurring and this condition would continue. Residual hay would continue to attract elk to the feedground after snowmelt, allowing for continued use of the feedground and prolonged impact to water resources during and after snowmelt and ground thaw.

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
		would improve in condition, especially in dry years, and there would be less potential for water quality degradation from livestock fecal matter in the vicinity of the wetlands. This alternative would improve water quality, wetlands, and riparian vegetative communities.	
Use of Alkali Creek feedground concentrates elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via sediment delivery and increased water temperatures.	Stream Bank Alteration	This alternative would reduce concentrated elk trailing that is currently occurring along Alkali Creek. Stream channel conditions and elevated sediment levels would improve over a period of five to twenty years.	Elk would continue to trail across Alkali Creek to reach the feedground, resulting in no improvement to existing conditions along Alkali Creek. Degraded channel condition, altered channel function, and elevated sediment delivery to the stream would continue. Conditions along the Gros Ventre River associated with the feedground would remain unchanged.
Fishery/Amphibian Resources			
Use of Alkali Creek feedground concentrates the elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via	Snake River Cutthroat Trout	Beneficial Impact	May impact individuals or habitat but is not likely to trend towards federal listing or cause a loss of viability.
	Rainbow Trout	Beneficial Impact	May impact individuals or habitat but is not likely to trend towards federal listing or cause a loss of viability.
	Boreal Toad	Beneficial Impact	May impact individuals but not likely to trend toward federal listing.

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
sediment delivery and increased water temperatures.	Boreal Chorus Frog	May impact individuals but is not likely to contribute to federal listing or loss of population viability.	May impact individuals but not likely to trend toward federal listing.
	Columbia Spotted Frog	May impact individuals but is not likely to contribute to federal listing or loss of population viability.	May impact individuals but not likely to trend toward federal listing.
Wildlife Resources			
Use of Alkali Creek feedground could impact elk, wolves, Canada lynx, grizzly bears, greater sage-grouse, martens, Peregrine falcons, great gray owls, boreal owls, and northern goshawks, wolverines, and other wildlife, many that use meadows, sagebrush, aspen, and riparian habitat.	Grizzly bear	May affect, not likely to adversely affect.	May affect, not likely to adversely affect.
	Canada lynx and Revised Designated Critical Lynx Habitat	No impact	May affect, not likely to adversely affect.
	Wolverine	Will not jeopardize the continued existence of the species.	Will not jeopardize the continued existence of the species.
	Gray Wolf	No impact	Beneficial impact
	Sage-grouse	No impact	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.
	North American Marten	Positive effects by improving conditions for their prey,	Degraded habitat conditions for marten prey in the vicinity (less than 720 meters) of the feedground site, but the prime habitat upslope of the feedground would be little affected.
	Bighorn sheep	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
	Elk	No effect on elk numbers; improvement in habitat conditions near the Alkali Creek feedground.	No effects on elk numbers; continued negative effect on habitat conditions near the Alkali Creek feedground.
	Mule Deer, Moose and Pronghorn	Some minor changes in the spatial distribution of herbivory and habitat conditions in the corridor analysis area would occur as a result of elk shifting to other feedgrounds. No effect to population trends of mule deer, moose, and pronghorn within their respective herd units.	For moose and mule deer, this alternative contributes negatively toward achieving the herd objectives because it creates less favorable habitat conditions (less woody browse) for the two species, near the feedground .This alternative improves pronghorn habitat conditions by impeding development of deciduous woody vegetation, contributing positively to the desired population trend.
	Peregrine falcon, great gray owl, boreal owl, and northern goshawk	Beneficial impact	May impact individuals or habitat but not likely to contribute to a trend towards federal listing or cause a loss of viability to the population or species.
	Brewer’s Sparrow	Because of the improved acreage and condition of sagebrush, the No Action alternative would contribute positively, but slightly, to population increases of Brewer's sparrows on the corridor analysis area and the BTNF.	The proposed action would carry negative effects on the height and breadth of individual sagebrush plants and the coverage of sagebrush in the corridor analysis area, with effects most visible near the feedground. Elk herbivory and trampling would affect sagebrush and decrease residual (over-winter) herbaceous vegetation such as grasses and forbs needed by insect prey of the sparrows during the subsequent breeding (spring) and brood-rearing (summer) season. This

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
			would likely reduce, albeit slightly, numbers of Brewer's sparrows on the analysis area and the BTNF.
	Migratory birds	Minor positive effects on habitat and populations of Calliope hummingbird, Willow flycatcher, Loggerhead shrike and Sage thrasher at the scale of the analysis area and the BTNF.	Minor negative effects on habitat and populations of Calliope hummingbird, Lewis's Woodpecker, Williamson's sapsucker, Olive-sided flycatcher, Willow flycatcher, Loggerhead shrike and Sage thrasher at the scale of the analysis area and the BTNF.
Wilderness and Wild and Scenic Rivers			
Use of Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands. These vegetation impacts could affect wilderness character in the Gros Ventre Wilderness, outstandingly remarkable values (ORVs) in the Gros Ventre Wild and Scenic River Corridor,	Wilderness	Slight improvement in the natural, untrammeled, and undeveloped qualities of wilderness character.	Slight negative effect on the natural, untrammeled, and undeveloped qualities of wilderness character.
	Wild and Scenic River	No effect	No effect

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
Climate Change			
Climate is one of the primary drivers of the physical and ecological processes that determine the distribution, structure, and function of ecosystems.	Carbon	No effect	No effect

Unavoidable Adverse Effects and Irreversible and Irretrievable Commitments of Resources

- Detrimental soil disturbance would occur as a result of compaction and erosion caused by cross country travel by horses, machinery, and equipment and trampling by elk.
- Vegetation species richness, diversity, and vigor would be affected. Losses could occur in willow habitat within and adjacent to feedgrounds due to loss of root stock as continued heavy browsing by elk in the winters prevents suppressed willow plants in wet meadow habitat from recovering to a healthy condition. Loss of aspen habitat could occur due to heavy browsing.
- Water quality would be affected by wetland and stream bank damage, erosion and sedimentation in both alternatives.
- Wildlife would be affected by impacts to sagebrush, riparian, and aspen wildlife habitat in both alternatives.
- Feedgrounds increase the probability of disease and parasite transmission among elk, including brucellosis, chronic wasting disease and other diseases. While the arrival of CWD is beyond the control of wildlife managers, the potential effect would be greater under any alternative where large numbers of animals are concentrated on feedgrounds. The loss would be irretrievable because in addition to always being fatal to infected animals, chronic wasting disease contaminates the environment for long periods of time. Soil on the feedground could become a reservoir of CWD that would continue to infect animals many years into the future.
- The potential exists for irretrievable commitments of predator and scavenger resources to occur if CWD became established and substantially reduced the elk population. (U. S. Fish and Wildlife Service and National Park Service Bison and Elk Management Plan and Environmental Impact Statement (2007)).
- Elk browsing of aspen adjacent to Alkali Creek feedground would affect the natural appearance on approximately 388 acres in the Gros Ventre Wilderness.

Preparers, Contributors and Distribution

The DSEIS was prepared by Forest Service employees in collaboration with federal state and local government agencies and federally recognized tribes. The DSEIS will be posted electronically at the BTNF website and distributed to individuals who specifically request a copy of the document. A notice of availability of the Final SEIS will be sent to those who submitted comments during the scoping period and to appropriate Federal agencies, federally recognized tribes and State and local governments. Comments on this DSEIS may be posted at the BTNF website or mailed and must be received within 45 days from the date the Environmental Protection Agency Notice of Availability is published in the Federal Register.

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CHAPTER 1. PURPOSE AND NEED FOR ACTION

Document Structure

The Forest Service has prepared this Draft Supplemental Environmental Impact Statement (DSEIS) in compliance with the *National Environmental Policy Act* (NEPA) and other relevant federal and state laws and regulations. The Forest Service proposes to authorize the continued use of 91 acres of National Forest System lands at Alkali Creek feedground by the Wyoming Game and Fish Commission for facilities and feeding grounds associated with their ongoing winter elk management program. This DSEIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and an alternative to the proposed action. The document is organized into four chapters:

- *Chapter 1. Purpose and Need for Action*: The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2. Alternatives, Including the Proposed Action*: This chapter provides a more detailed description of the agency's proposed action and the No Action Alternative. This discussion also includes mitigation measures. Finally, this section provides a summary table of environmental consequences associated with each alternative.
- *Chapter 3. Affected Environment and Environmental Consequences*: This chapter describes the project area and environmental effects of implementing the Proposed Action Alternative and the No Action Alternative. This analysis is organized by resource area.
- *Chapter 4. Consultation and Coordination*: This chapter provides a list of preparers and agencies consulted during the development of the DSEIS.
- *Appendices.* The appendices provide more detailed information to support the analyses presented in the DSEIS.

Additional documentation may be found in the project planning record located at the Forest Supervisor's Office at 340 N. Cache, Jackson, Wyoming 83001.

Background

The Bridger-Teton National Forest (BTNF) received a request from the Wyoming Game and Fish Commission to continue to use facilities on National Forest System lands at Alkali Creek within the Jackson Ranger District to conduct their elk winter feeding and related management activities. This request was studied, along with proposals to continue similar use at other National Forest System locations, and the analysis was presented in an Environmental Impact Statement in July 2008. In the Record of Decision that accompanied that document, the Forest Supervisor stated that more information was needed before a decision could be made concerning use at Alkali Creek feedground. Specifically, the Jackson District Ranger was directed to order a wilderness boundary survey and cooperate with the Wyoming Game and Fish Commission to perform a more detailed survey of vegetation effects inside the Gros Ventre Wilderness adjacent to the existing feedground. The Forest Supervisor stated that a decision would be made when the

project record was supplemented with this additional information. This DSEIS presents that new information, along with other project-related information that has been collected since July 2008. This DSEIS also presents pertinent information from the 2008 FEIS.

The Wyoming Game and Fish Department (WGFD) has roots all the way back to the 1890s. That period marked a major decline in the population of wild game in the state of Wyoming due to unlimited harvesting practices used by settlers. During that decade, the positions of State Fish Warden (1890) and State Game Warden (1899) were established to protect Wyoming's wildlife from dangers of over harvesting. These positions were dedicated to the replenishment of the wildlife in the area.

In 1921, the Wyoming Game and Fish Commission (WGFC) was established to provide citizen oversight to the WGFD. The Commission is made up of seven (7) officials, appointed by the Governor, who each represent a region in the state. WGFC serves as the policy making board responsible for the direction and supervision of the Director of the WGFD. The WGFC provides an adequate and flexible system of control, propagation, management and protection and regulation of all wildlife in Wyoming through actions of the WGFD.

Supplemental feeding of elk (*Cervus elaphus*) has been conducted in northwestern Wyoming since the early 1900s. The initiation of providing supplemental feed to elk was in response to large-scale winter die-offs, which were due in part to the loss of migration routes to suitable winter range and the direct loss of winter range due to rural development and fencing (Taylor 2001). Emergency feeding was documented as early as 1907 when a Pinedale game warden provided feed for 200 snowbound elk on Willow Creek; the Supervisor of the Teton National Forest secured funds to purchase the hay (Sheldon, 1927; Brown, 1947). A 1939 Wyoming statute designates the WGFD liable for damages caused by big game animals. Many feedgrounds were established in the 1940s and 1950s to prevent elk from entering private lands and damaging stored crops.

The WGFD's supplemental elk feeding activity today is a daily event during the winter months at 21 feedgrounds and one staging area in western Wyoming. The U. S. Fish and Wildlife Service (USFWS) also operates a feeding program at the National Elk Refuge. Figure 1 displays a map of the 21 WGFD managed feedgrounds, the staging area (North Piney) and the National Elk Refuge. Eight of the 23 areas are on National Forest System lands: Alkali Creek, Dell Creek, Dog Creek, Fall Creek, Fish Creek, Forest Park, Muddy Creek, and Upper Green River.

Although feedgrounds were initiated to maintain elk populations, they have become an effective tool in reducing damage to haystack yards and winter pastures on private lands (WGFD 2007) and in reducing potential or transmission of brucellosis to livestock. Elk feeding locations have been strategically placed within the BTNF and near the National Forest boundary to effectively gather elk as they transition from summer ranges down to lower elevations, mostly preventing elk migrating through private lands en route to lower elevations. Forest Service regulations require authorization for use and occupancy of National Forest System lands.

This DSEIS displays the analysis of the proposal to continue to authorize the WGFC to use a site on National Forest System land at Alkali Creek for their winter elk management activities.

Alkali Creek feedground and two other feedgrounds (Fish Creek and Patrol Cabin) are located within the Gros Ventre drainage northeast of the town of Jackson within the Jackson Elk Herd Unit. Specifically, Alkali Creek feedground is located in Section 23 of Township 42 North,

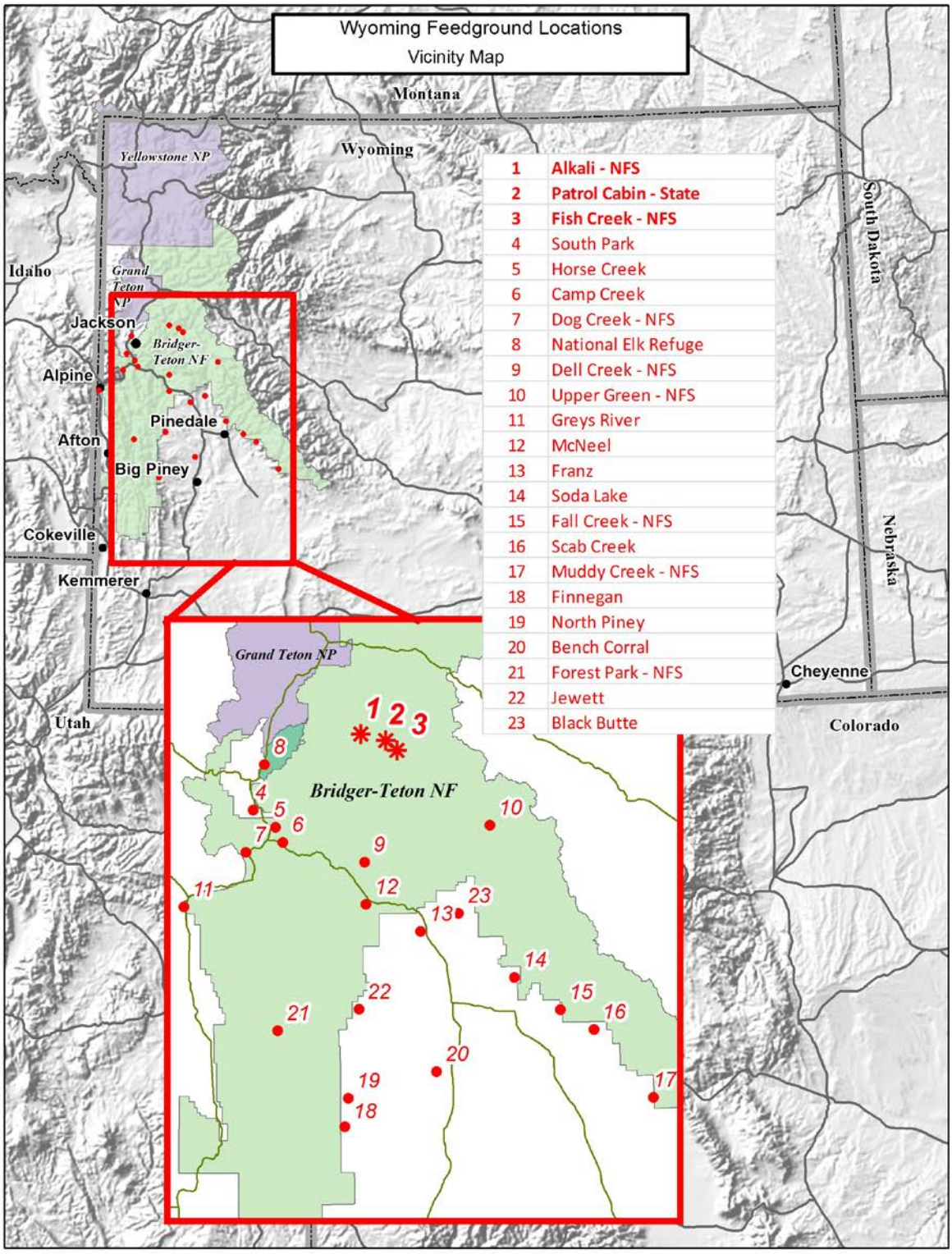

Figure 1: Elk Feedground Locations

Range 113 West in the 6th Principal Meridian. A vicinity map of the feedgrounds in the Gros Ventre is displayed in Figure 3 in Chapter 2.

Daily feeding at the three feedgrounds started in the mid-1960s (WGFD 2007). Facilities and feeding areas at Alkali Creek and Fish Creek are located on National Forest System lands. Patrol Cabin Feedground is operated on state-owned lands. Historically these feedgrounds were operated relatively independently of each other with little interchange of elk among the three feedgrounds. Feeding at Alkali Creek, Fish Creek, and Patrol Cabin prior to 1998 saw an average of 497, 764, and 490 elk at each feedground respectively. The average length of feeding was 98 days at Alkali Creek and Fish Creek and 89 days at Patrol Cabin.

Since 1998, wolf activity has influenced elk distribution in the Gros Ventre, resulting in elk aggregating into one large group of up to 3,221 animals. Elk in the Gros Ventre now typically congregate on one feedground, and move to another feedground in the drainage in response to wolf pressure. See Appendix 1 for detailed summaries of number of elk, tons and days fed, number of dead elk, cost/elk, and tons fed/elk for these three feedgrounds each year since 1975.

During summer, WGFD personnel typically conduct maintenance on various structures (i.e., haystack yards, and elk traps) on several feedgrounds. During fall, haystack yards are stocked with certified weed-free hay transported on semi-trucks from various producers throughout Lincoln and Sublette Counties in Wyoming and from producers in nearby Idaho locations. Over the past 37 years, an average of 37 tons of hay was delivered to Alkali Creek feedground annually. This equates to approximately 9.15 truckloads per year.

The majority of activity at Alkali Creek feedground occurs during the winter months. Elk behaviors are regularly observed by WGFD personnel and contracted elk feeders beginning in November to determine when feeding should be initiated. Several factors are weighed before feeding actually starts, such as number of animals in the area, amount of natural vegetation present, the possibility for livestock co-mingling and damage to private property, and knowledge of past elk movements. As winter nears, teams of draft horses are hauled or walked into the feedground before snow makes the access road impassible. Draft horses are used to haul hay in the feeding operation. The horses are held in corrals and fed and watered daily.

Once the decision has been made to begin feeding the elk, the feedground supervisor or manager contacts the feeders. Two to three feeders are typically hired to feed in the Gros Ventre area. These feeders typically reside in the WGFD cabin at Patrol Cabin and utilize snowmobiles or horse teams to access all three feedgrounds.

Elk feeders typically follow a daily routine of harnessing a team of horses and attaching them to the sleigh. They then load the sleigh with hay. The feeder drives the team out onto the feedground area and distributes the hay to the elk. This process is repeated until enough hay has been spread to feed the number of elk on the feedground. The average amount of daily hay consumption at feedgrounds from 1975-76 through 2011-12 is 8.0 pounds/elk. At the end of the feeding season, the draft horses are removed from National Forest System lands.

The WGFD utilizes the winter months to classify the elk on the feedgrounds. This activity typically occurs in late January to February and is conducted once per feedground. Department personnel count numbers of branch-antlered bulls, spikes, cows, calves and the total number of elk on the feedground. This information is used to determine hunting seasons.

Although feedgrounds have been very effective in preventing elk depredating private crops, the human-influenced concentration of elk during winter and early spring perpetuates the disease brucellosis, caused by the bacterium *Brucella abortus* (Thorne et al. 1978). Transmission of *Brucella* typically occurs orally when cattle and/or elk come into contact with infected aborted fetuses, fetal membranes and fluids, or uterine discharges (Thorne et al. 1982, Cheville et al. 1998). Brucellosis seroprevalence of elk on feedgrounds averages 22 percent, while brucellosis seroprevalence in elk from herd units adjacent to feedgrounds varies from 0 to 20 percent and has been increasing among elk populations in northwest Wyoming. Elk completely independent of feedgrounds have no prevalence of the disease (Scurlock and Edwards 2010). Brucellosis infections in cattle can impact Wyoming's brucellosis free status, resulting in increased testing requirements and potential trade sanctions on Wyoming's cattle producers. A major role of elk feedgrounds today is to reduce the commingling of elk and cattle for concerns over elk-to-cattle brucellosis transmission. Thus, elk feedgrounds maintain and increase the prevalence of the disease in elk while limiting elk-to-cattle transmissions at the same time. For further details see Appendix 2, *Elk Feedgrounds in Wyoming* (WGFD 2004).

Various disease management efforts are implemented on elk feedgrounds during winter. *Brucella* strain 19 vaccination of calves is conducted annually. Vaccination occurs in late January to March and is typically conducted by the feeder. Only calves are vaccinated and typically 100 percent of the calves on the feedground are inoculated. The WGFD also monitors the distribution and prevalence of brucellosis on four to six feedgrounds a year during winter. A permanent elk trap exists on Alkali Creek feedground. Elk are trapped until a sufficient sample size for 85 percent confidence level for brucellosis exposure rate is reached.

Chronic wasting disease (CWD) has recently elicited more attention because of the concern that the disease will eventually affect elk wintering on feedgrounds in western Wyoming. CWD is a chronic, fatal disease of the central nervous system of captive and free-ranging mule and white-tailed deer, elk, and moose and belongs to a group of diseases called transmissible spongiform encephalopathies. Research suggests CWD is transmitted by animal-to-animal contact or via contamination of feed or pasture with saliva, urine and/or feces. CWD has been documented in eight states and one Canadian province, including Wyoming. To date, CWD has not been observed in elk in western Wyoming. The WGFD conducts CWD surveillance annually and detected the disease in a mule deer in 2007 within 80 miles of an elk herd unit with feedgrounds. WGFD personnel have been collecting retropharyngeal lymph nodes from the heads of elk, deer, and moose throughout the Jackson and Pinedale regions for several years with the only positive test being a cow moose near Bedford in 2008. The WGFD's *Chronic Wasting Disease Management Plan Executive Summary* (2006) contains actions that will be implemented if CWD is identified in elk attending feedgrounds. This plan is attached to this document as Appendix 3.

Purpose and Need for Action

The Forest Service received a request from the WGFC to continue to use facilities on National Forest System lands to conduct their elk winter feeding and related management activities. Under 36 Code of Federal Regulations (CFR) 251.50, authorization is required for all special uses of National Forest System land except those authorized by the regulations governing sharing use of roads (36 CFR 212.9); grazing and livestock use (36 CFR 222); the sale and disposal of timber and special forest products, (36 CFR 223); and minerals (36 CFR 228). This action is needed,

because the existing authorization for Alkali Creek feedground will expire on December 31, 2013.

Proposed Action

The Forest Service proposes to authorize the continued use of 91 acres of National Forest System lands at Alkali Creek feedground by the WGFC for their winter elk management program, including one elk tagging corral, one horse corral, one tack shed, one haystack yard containing two hay sheds, a water facility, and a feeding ground The proposed action is described in detail in Chapter 2 of this document as Alternative 2. Figure 2 displays a photograph of Alkali Creek feedground. Additional photographs are displayed in Appendix 4.

Figure 2: Alkali Creek Feedground in the Springtime

Decision Framework

The Forest Service decision is limited to the determination of whether or not the WGFC should be authorized to use National Forest System land for its winter elk management activities at Alkali Creek feedground and if authorized, what terms and conditions should be included in the authorization. The primary considerations for the Forest Service are the potential effects to land under its administration and any potential conflicts the WGFC operation may have with public uses and other National Forest programs.

Public Involvement

This project analysis began when the Forest Service received a request from WGFC to continue to use facilities on National Forest System lands at six existing feedgrounds (Alkali Creek, Dog Creek, Fall Creek, Fish Creek, Muddy Creek, and Upper Green River) and to expand feeding onto National Forest System lands adjacent to a feedground on state-managed lands (Patrol Cabin). A Notice of Intent (NOI) to prepare an Environmental Impact Statement was published in the Federal Register on July 23, 2007. The NOI asked for public comment on the proposal from July 23, 2007 to September 17, 2007. In addition, as part of the public involvement process, the agency mailed a scoping letter describing the proposed actions and requesting comments to approximately 75 people and organizations on July 18, 2007. A news release was published in the Jackson Hole News & Guide on August 8, 2007, describing the proposed use and inviting public comment. Public meetings were held in Jackson, Wyoming on August 28, 2007 and Pinedale, Wyoming on September 4, 2007. The scoping letter, mailing list, comments received, and summary of comments are in the project file.

A Draft EIS (DEIS) was prepared and distributed to the public. A Notice of Availability (NOA) for the DEIS was published in the Federal Register on March 21, 2008, and a legal notice of this availability was published in the Casper Star Tribune March 26, 2008. The DEIS was posted and was downloadable on the BTNF website, and hard copies were distributed upon request. Letters were sent to interested parties notifying them that the DEIS was available for review. The NOA informed the public that the review and comment period extended from 3/21/08 to 5/5/08. Public comment and the agency response to comment are documented in the project record.

A Final EIS was released and a Record of Decision was signed on July 15, 2008. A legal notice was published in the Casper Star Tribune July 17, 2008, announcing a decision to authorize continued use at Dog Creek, Fall Creek, Fish Creek, Muddy Creek, and Upper Green River feedgrounds and deferred the decision for Alkali Creek feedground. The legal notice began the 45-day project appeal filing period. Two project appeals were received and considered by Regional Forester. The Forest Supervisor's decision was subsequently affirmed and implemented by issuance of a special use permit with a 20 year term.

A Notice of Intent (NOI) to supplement the 2008 EIS to provide additional information concerning Alkali Creek feedground was published in the Federal Register on April 23, 2012. A news release concerning the NOI was provided to the BTNF news release mailing list. Letters or email messages were sent to the parties involved in this project who received notice of the 2008 Record of Decision. During the subsequent 30 day comment period, 40 comment letters were received from individuals, businesses, organizations and agencies. These comment letters were reviewed and used by the Forest Supervisor to determine the appropriate scope of analysis.

Issues

The Forest Service identified issues through the public scoping and comment process and the use of an interdisciplinary team of natural resources specialists. The following significant issues were used to compare the Proposed Action Alternative to the No Action Alternative:

Issue #1. High concentrations of elk on Alkali Creek feedground could cause soil compaction and/or increased erosion that may affect soil quality. Alternatives are compared

in this analysis describing the current percent of detrimental soil disturbance at the feedground and comparing the potential number of acres affected by alternative.

Issue #2. Use of Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands. These vegetation impacts could affect wilderness qualities in the Gros Ventre Wilderness, outstandingly remarkable values (ORVs) in the Gros Ventre Wild and Scenic River Corridor, and/or pronghorn migration. Alternatives are compared in this analysis by a narrative describing the expected vegetation changes and by a comparison of acres affected by alternative.

Issue #3. Use of Alkali Creek feedground concentrates the elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via sediment delivery and increased water temperatures. Alternatives are compared in this analysis by considering the existing condition of streambanks and wetlands within and adjacent to the feedground and analysis area, then comparing the extent of stream banks and wetlands potentially affected by the alternatives.

Issue #4. Use of Alkali Creek feedground could impact elk, wolves, scavengers, Canada lynx, grizzly bears, greater sage-grouse, and other wildlife species that utilize sagebrush and riparian habitat. Alternatives are compared in this analysis by a narrative describing the expected displacement and habitat changes by alternative.

Table 1 records other issues identified and explains how they are addressed in this DSEIS.

Table 1: List of Other Issues

	Issue	How Addressed
1	Identify and disclose historical and existing migration corridors used by elk; analyze threats to continued migration; analyze potential for restoration of historical migration.	WGFC would continue to direct WGFD to feed elk on private, state, or other federal lands, even if a permit is not issued for this feedground. Because this activity would continue, the Forest Service does not have the ability to affect the migratory behavior of the elk herds with this decision.
2	Use of elk feedgrounds concentrates the elk, which increases the risk of transmission of brucellosis from elk to elk, which in turn may increase potential of transmission of brucellosis to cattle.	Alternatives are compared by acres of feedground by alternative and a narrative describing potential for interaction between livestock and elk. Because it is projected that feeding would continue even if the use of National Forest System lands is not authorized, the Forest Service decision and alternatives would not affect the potential for brucellosis transmission between elk. Detailed discussions of brucellosis management options are available in the WGFD elk and bison Brucellosis Management Action Plans and the Bison and Elk Management Plan and Environmental Impact Statement for the National Elk Refuge and Grand Teton National Park.

	Issue	How Addressed
3	Elk feedgrounds could become an infection source for transmission of CWD to elk, mule and white-tailed deer, and moose when CWD arrives in western Wyoming. Feedground soil could become contaminated with disease prions and be a reservoir for infection.	Because WGFC would continue to direct WGFD to feed elk on private, state, and other federal lands even if a permit is not issued for this feedground, elk will continue to congregate on state-managed feedgrounds regardless of this Forest Service decision. The potential for CWD transmission through use of feedgrounds is addressed in Wyoming's CWD Management Plan, Appendix 3 and the USDI Bison and Elk Management Plan and Environmental Impact Statement for the National Elk Refuge and Grand Teton National Park. Because it is projected that feeding would continue regardless of the Forest Service decision proposed here, this decision does not affect or control the potential for CWD transmission.
4	Elk feeding operations could contaminate ground water with fecal coliform bacteria.	This issue is not supported by scientific or factual evidence.
5	The agencies should spend money improving habitat instead of feeding nonnative forage to elk.	The Forest Service is working with other agencies to improve habitat on National Forest System lands. This issue is being addressed in other projects. However, habitat improvement projects cannot compensate for the loss of native winter range in the short-term, and would not affect the current needs for supplemental feeding.
6	Identify and assess the impact of livestock grazing upon elk transitional and winter range. Analyze forage availability and usage of forage by livestock and wildlife. BTNF must calculate the amount of forage on winter ranges available to cervids and the carrying capacity of the range: analyze if cattle allotments need to be adjusted to leave more forage for cervids. Weigh the public interest against the special interests of a few ranchers, who benefit by having forage on the winter range over-allocated to cattle; wildlife should have priority over cattle on public lands.	Because WGFC would continue to direct WGFD to feed elk on private, state, and other federal lands even if a permit is not issued for this feedground, elk will continue to congregate on state-managed feedgrounds and therefore continue to under-utilize transitional and winter ranges regardless of the amount of forage available. Potential effects of livestock grazing have been addressed in the Forest Plan and in site-specific analyses for the authorization of livestock grazing.
7	Identify and analyze the threat of mineral development, especially natural gas on elk winter ranges.	This document analyzes the consequences of the proposed action. Mineral development is not proposed on this feedground.
8	WGFD should not have cooperating agency status. They are proponents of the project and are not objective.	Regulations state that the Forest Service retains exclusive authority to make decisions on projects or programs for which it has responsibility by law. However it is appropriate that the Forest Service grant cooperating status to state and local agencies

	Issue	How Addressed
		due to complex jurisdictional and management issues related to federal lands and the fact that state and local governments manage lands and resources which are often near, adjacent to, or intermingled with federal land. Cooperating agency status is appropriate when a state agency, such as WGFD has specialized expertise with regard to any environmental issue. In this case, WGFD has specialized expertise concerning elk and other wildlife.
9	Analyze the economic impacts on tourism, recreation, big game hunting, and livestock interests of closing the feedgrounds versus keeping them open; especially the economic impacts of a CWD epidemic.	It is projected that WGFC would continue to direct WGFD to feed elk on private, state, or other federal lands, even if a permit is not issued for this feedground. Because this activity would continue, the Forest Service decision is not expected to change the economic effects to tourism, recreation, big game hunting, and livestock interests.
10	Elk should be protected instead of grown for hunters to kill.	The WGFC has the authority, jurisdiction, and responsibility to manage, control, and regulate fish and wildlife populations on National Forest System lands. The Forest Service is responsible for the management of National Forest System lands in Wyoming and the fish and wildlife habitats on these lands (Forest Service Agreement # 00-MU-11020000-052).
11	Slaughter of seral positive elk is an indirect effect of feedground permits and should be stopped.	Test and removal is an elk management program run by the WGFD. The WGFC has the authority, jurisdiction, and responsibility to manage, control, and regulate fish and wildlife population on National Forest System (NFS) lands. The Forest Service is responsible for the management of NFS lands in Wyoming and the fish and wildlife habitats on these lands (Forest Service Agreement # 00-MU-11020000-052).
12	Effects of brucellosis surveillance, vaccination, and the removal of seropositive elk	It is projected that the WGFC would direct WGFD to continue these activities even if the use of National Forest System lands was not authorized. Therefore, the Forest Service decision would not change the effects of this program. Effects of the program are discussed in WGFD's Jackson Elk Herd Unit E102 Brucellosis Management Action Plan.
13	A given population should be no larger than that which the habitat can support.	While the Forest Service manages habitat that supports wildlife the state of Wyoming manages elk herd numbers. Much of the native winter range for elk is not located on the National Forest, and is not available due to development and agriculture. The WGFD has determined the appropriate elk population levels, and implemented a management strategy to maintain those numbers in light of the winter range currently available. There are ongoing efforts to

	Issue	How Addressed
		improve habitat on the National Forest, particularly winter range, but these efforts cannot compensate for the loss of native winter range in the short term.
14	Permitting feedgrounds will result in the need to spend public funds to protect the structures from wildfire.	Teton County government holds the responsibility for wildfire emergency response activities, including structure protection, within their jurisdiction. Teton County government would consider safety, available resources, timeliness, and overall incident objectives in their decision whether or not to defend the WGFD structures at Alkali Creek feedground in event of wildfire.
15	Feedground operations result in greenhouse gas emissions and other pollutants.	This document includes a section concerning climate change.
16	Feedground operations result in Forest Service expenditures to monitor and enforce the permit conditions.	The Forest Service expends approximately $500 annually to monitor and enforce the permit conditions.
17	Cessation of feeding at Alkali Creek feedground would affect elk migration from the Gros Ventre Valley to the National Elk Refuge.	Impacts of the No Action Alternative on elk are discussed in the Wildlife section in Chapter 3 of this document.

Other Related Efforts

Documents that address issues related to supplemental elk feeding including disease, habitat impacts, and effects on other wildlife include:

- U.S. Department of Interior, Fish and Wildlife and National Park Service. 2007. Bison and Elk Management Plan and Environmental Impact Statement for the National Elk Refuge and Grand Teton National Park
- Wyoming Game and Fish Department, 2008. Jackson Bison Herd B101 Brucellosis Management Action Plan.
- Wyoming Game and Fish Department. 2007. Using Test and Slaughter to Reduce Prevalence of Brucellosis in Elk Attending Feedgrounds in the Pinedale Elk Herd Unit of Wyoming; Results of a Five-year Pilot Project. Final Report.
- Wyoming Game and Fish Department. 2012. Chronic Wasting Disease Summary for 2011.
- Wyoming Game and Fish Department. 2012. Chronic Wasting Disease Monitoring in the Jackson Region for 2011. Prepared for the National Elk Refuge - US Fish & Wildlife Service. WGFD Jackson Region, 8pp.
- Wyoming Game and Fish Department. 2012. Wyoming Gray Wolf Management Plan.

- Wyoming Game and Fish Department, 2007. Jackson Elk Herd E102 Brucellosis Management Action Plan.
- Wyoming Game and Fish Department, 2011. Jackson Elk Herd E102 Brucellosis Management Action Plan Update.
- Wyoming Game and Fish Department, 2006. Chronic Wasting Disease Management Plan, Executive Summary.
- Wyoming Game and Fish Department, 2004. Elk Feedgrounds in Wyoming.

The above listed documents are incorporated by reference as part of this DSEIS. The last two documents are appended to this DSEIS as Appendix 2 and Appendix 3. Please see the bibliography for additional references that were considered in this analysis.

The *Bison and Elk Management Plan and EIS* describe the environmental effects of the elk management activities on feedgrounds on nearby federal lands. Many of the issues and effects are similar to the proposed action on the BTNF. The *Brucellosis Management Action Plans*, *Test and Removal, Chronic Wasting Disease Management Plan, Chronic Wasting Disease Summary for 2011, and the Chronic Wasting Disease Monitoring in the Jackson Region for 2011* provide supplementary information concerning the prevalence, risks and consequences of these diseases. The *Wyoming Gray Wolf Management Plan* provides supplementary information about interactions between wolves and elk at feedgrounds and potential management actions that could be taken by WGFD personnel. Operating procedures and program history are described in *Elk Feedgrounds in Wyoming*.

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Introduction

This chapter describes and compares the alternatives considered for the long-term authorization for WGFC to use National Forest System lands at Alkali Creek for their winter elk management activities. It includes a description and map of the proposed feedground area. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for comparison among options.

Alternatives Considered in Detail

Two alternatives were considered in detail – No Action and the Proposed Action. Table 2 compares the authorizations involved in the Proposed Action Alternative to the No Action Alternative. Figure 3 displays a vicinity map showing Alkali Creek feedground, the National Elk Refuge and other feedgrounds in the Gros Ventre Area.

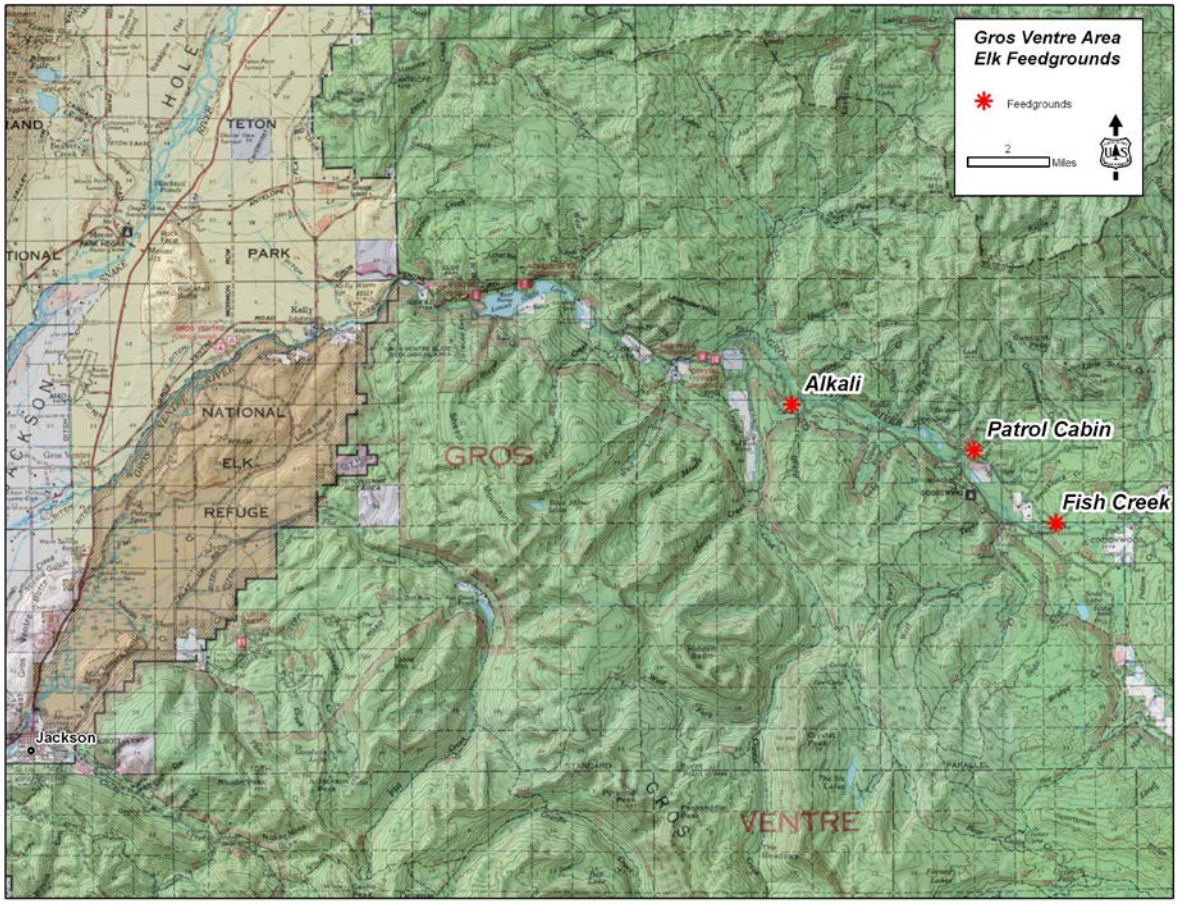

Figure 3: Existing Feedground Locations in the Vicinity of Alkali Creek

Table 2: Alternative Comparison Table

	Alternative 1: No Authorization	Alternative 2: Proposed Action
Alkali Creek Feedground Acres	0	91
Alkali Creek Feedground Facilities	None Authorized	1 haystack yard with 2 hay sheds, corrals, tack shed, elk trap, and water development

Action Common to Both Alternatives

Alkali Creek feedground is within designated winter range; therefore public access is restricted from December 1st through April 30th of each year as displayed on the winter travel map. Motorized recreation use restrictions would be maintained on designated routes adjacent to the permit area in both the Proposed Action Alternative and the No Action Alternative where no use is authorized.

Alternative 1 - No Action - No Special Use Authorization

Under the No Special Use Authorization Alternative, use of National Forest System lands for WGFC winter elk management activities would not be permitted at Alkali Creek feedground. WGFC would remove the existing facilities and re-habilitate impacts at this location.

The WGFC has informed the Forest Service that under this alternative, they would continue to implement their winter elk management activities in the Gros Ventre with facilities and feedgrounds at Patrol Cabin and Fish Creek. USFWS would also conduct winter elk management activities at the National Elk Refuge.

Alternative 2 - The Proposed Action – Special Use Authorization

The Agency's Preferred Alternative

Under the Proposed Action alternative, a Special Use Authorization would be reissued for continuation of use of 91 acres of National Forest System lands for WGFC winter elk management activities at Alkali Creek feedground. Specifically, the WGFD would maintain and operate one elk tagging corral, one horse corral, one tack shed, one haystack yard containing two hay sheds, a water facility, and a feeding ground associated with their ongoing winter elk management program. Figure 4 displays the location and boundary of Alkali Creek feedground.

Winter elk management activities include, but are not limited to feeding, capturing, vaccinating and testing elk, and removing seral positive elk from the population. Feeders are contract employees hired by the WGFD. During the feeding season, feeders live on state lands at Patrol Cabin. Feeders travel to the feedground by truck when roads are passable and by snowmobile when roads are snowbound. Access to the feedground includes, but is not limited to, feeding, trapping, maintenance, and hay hauling. WGFD employees and contractors may have vehicular access throughout the winter range closure area when performing duties associated with operating and maintaining the feedgrounds.

Elk feeders typically follow a daily routine of harnessing a team of horses and attaching them to the sleigh. They then load the sleigh with hay, drive the team out onto the feedground area and distribute the hay to the elk. This process is repeated until enough hay has been spread to feed the number of elk on the feedground. The average of daily hay consumption from 1975-76 through 2011-12 was 8.0 pounds/elk.

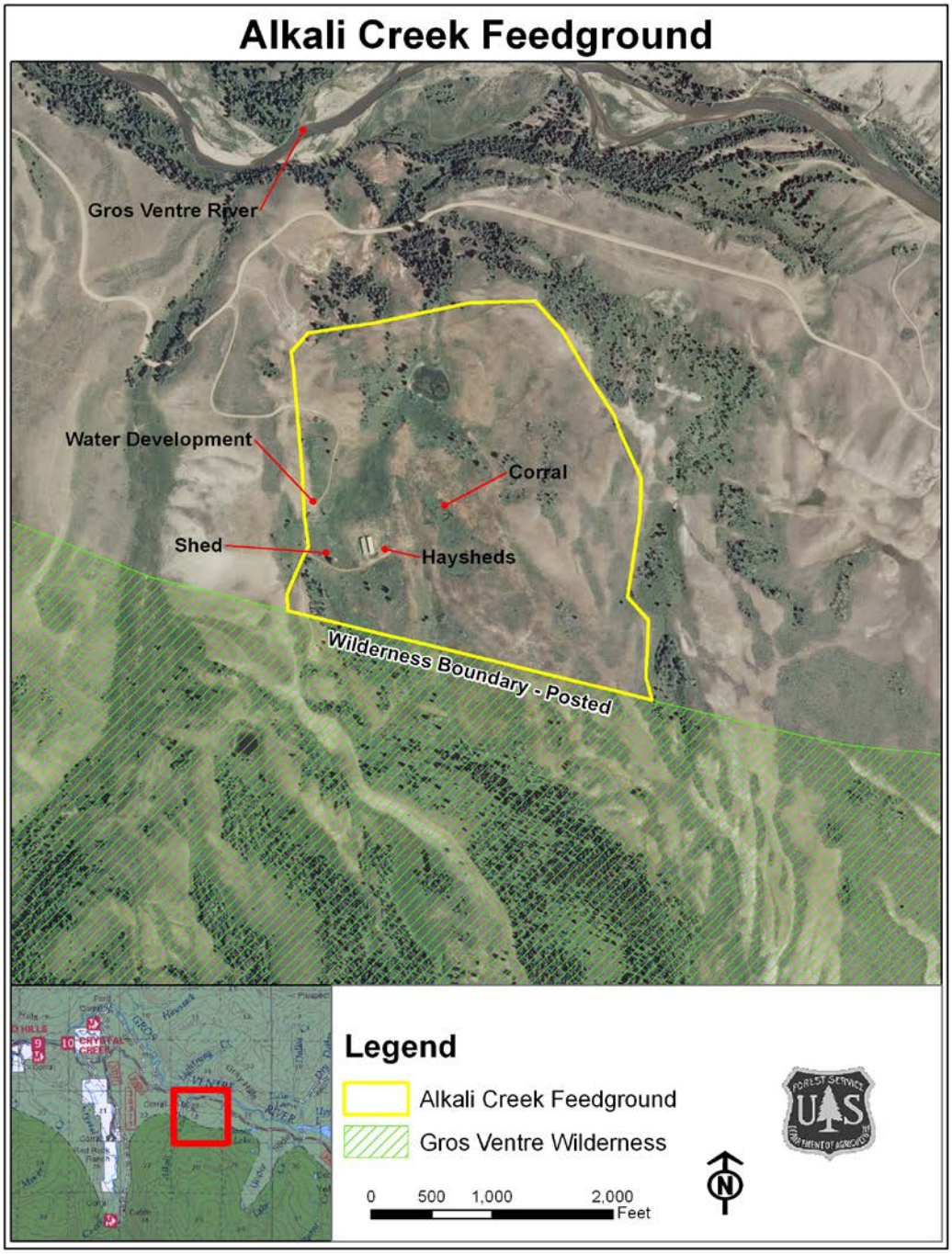

Figure 4: Alkali Creek Feedground Location and Boundary

Various disease management efforts are implemented during the winter. Calves are vaccinated with *Brucella* strain 19 and typically 100 percent of the calves on the feedground are inoculated. Occasionally, elk are trapped at Alkali Creek feedground. Elk are trapped and adult females are tested until a sufficient sample size for 85 percent confidence level for brucellosis exposure rate is reached.

During summer, WGFD personnel typically conduct maintenance on various structures (i.e., haystack yards, and elk traps). During fall, haystack yards are stocked with certified weed-free hay transported on semi-trucks from various producers throughout Lincoln and Sublette Counties in Wyoming and from producers in nearby Idaho locations. Details concerning the past and current operation at the feedgrounds in the Gros Ventre are found in Appendix 1.

Mitigation and Monitoring That Are Part of the Proposed Action Include:

1) Any hay or straw used in association with this permit would be certified and tagged as noxious weed or noxious weed seed free (Order 04-00-056,02-96-02) WGFC would use certified weed free hay to minimize the potential introduction of noxious weeds. The operation would comply with county ordinance where applicable.
2) WGFC would be responsible for monitoring and treating of noxious and invasive weeds within the permit area. Monitoring would occur annually.
3) In areas adjacent to the permitted area, the Forest Service would treat cheat grass invasions with herbicide and reseed areas with native grass adjacent to the feedground where cheat grass is prevalent. Monitoring would occur annually.
4) Forest Service monitoring of soil disturbance class and percent detrimental soil disturbance would occur about every 5 years.
5) Feeding is not authorized to take place on the mapped wetland areas or within 100 ft. from the outer edge of the wetlands and the channel that connects them.
6) Feeding operations would be conducted over frozen ground as much as possible to reduce the potential for soil compaction from tractors and hoofed animals.
7) Permittee must comply with the Bridger-Teton National Forest Food Storage Special Order (#04-00-104) year-round.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by the NEPA to rigorously explore and objectively evaluate a reasonable range of alternatives and to briefly discuss the reasons for eliminating alternatives that were not developed in detail (40 CFR 1502.14). Alternatives can be eliminated for various reasons, including that they are outside the scope of the Forest Service's authority or responsibility, duplicative of the alternatives considered in detail, or include components that would cause unnecessary environmental harm.

Public comments received in response to the Proposed Action Alternative did not provide suggestions for alternative methods for achieving the purpose and need. Commenters asked the

Forest Service to improve winter range on the BTNF, then eliminate all elk feeding and restore historical migration routes.

BTNF managers are working to improve winter range under other long-term planning efforts, however the Forest Service considered and dismissed from detailed consideration the alternative of WGFC stopping all elk feeding. This suggested alternative included reducing the number of elk in the herds, constructing elk-proof fencing around affected private land, eliminating elk feeding, and restoring historical migration routes. It was dismissed because the Forest Service does not have the jurisdiction to stop elk feeding. WGFD has informed the Forest Service they intend to continue to feed elk on private, state, or other federal lands, even if permits are not issued for feedgrounds on National Forest System lands. Because this activity would continue, Forest Service decisions cannot affect several of the impacts associated with WGFC's winter elk management activities, including prevalence of disease or disruption of elk migration and other movements. Winter feeding, test and removal, and brucellosis vaccination of elk are elk management activities conducted by the WGFC who has jurisdiction over state wildlife. Under various authorities, the state of Wyoming is also responsible for authorization of the taking of elk, whether it be for sport hunting, disease control for wildlife or agricultural purposes, or to reduce agricultural depredation and other damage to private property.

The Forest Service also considered and dismissed from detailed consideration the alternative of moving Alkali Creek feedground to an alternate location to reduce effects in the Gros Ventre Wilderness. Alkali Creek feedground was established in the mid-1960s to reduce damage to haystack yards and winter pastures on private land and to reduce co-mingling of elk and cattle that could result in brucellosis transmission. There is no alternate location in the near vicinity suitable for elk management activities that would both reduce private land damages and have less impact on the Wilderness.

Comparison of Alternatives

This section provides a summary of the elements of the alternatives and a summary of the effects of the alternatives. Information in tables 3 and 4 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively between alternatives.

Table 3: Summary of Alternative Elements

	Alternative 1 No Action	Alternative 2 Proposed Action
Project Area - Acres Occupied by Winter Elk Management Special Use Permit	0	91 acres
Analysis Area - Area Within 1 Mile of the Special Use Permit Area	0	3,062 acres
Percent of Soil Surface Potentially Detrimentally Disturbed in the Project Area	None after 10 to 20 years	8%
Acres of Potential Wetlands Affected in the Project Area	2.9 acres improved	2.9 acres remain affected
Acres of Riparian Vegetation Potentially Affected in the Analysis Area	84 acres improved	84 acres remain affected
Acres of Sagebrush Affected in the Analysis Area	1,394 acres improved	1,394 acres remain affected
Acres of Aspen Affected in the Analysis Area	95 acres improved	95 acres remain affected
Distance of Stream Channel Potentially Affected	5.7 miles improved	5.7 miles remain affected
Potential Effects to Wildlife Species	Improves habitat for species dependent upon aspen, sagebrush, willow, and cottonwood	Maintains current amount degraded habitat for species dependent upon aspen, sagebrush, willow, and cottonwood
Potential for Disease Transmission Elk-to Elk	Elk would be concentrated on 20 state operated Feedgrounds. More elk would likely congregate on the National Elk Refuge Feedground, increasing potential for disease transmission.	Elk would be concentrated on 21 state operated feedgrounds and the National Elk Refuge
Potential for Disease Transmission Elk-to Cattle	Elk would likely move onto private land in-holdings west of Alkali Creek feedground and mingle with cattle.	The existing feedground (and other WGFD measures) reduces potential for elk-to-cattle transmission
Acres of Vegetation Affected Within Wilderness	388 acres regain natural appearance over time	388 acres remain affected

Table 4: Environmental Effects Summary

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
Soil Resources			
High concentrations of elk on the feedground during certain soil conditions could cause soil compaction and/or increased erosion that may affect soil quality.	Compaction and Erosion	Soil conditions would improve on the project area within 5 to 10 years but detrimental soil disturbance would likely increase on Patrol Cabin and Fish Creek feedgrounds.	Soil detrimental disturbance is 8% (moderate compaction) on 7.3 acres and is likely to remain so. Soil disturbance is not expected to exceed 15%, which is the guideline threshold when mitigation and restoration should be implemented.
	Soil Loss	No soil displacement is expected to occur as a result of stopping winter management activities at Alkali Creek feedground.	No soil displacement has been observed and is not expected to occur as a result of continuing feeding.
Vegetation Resources			
Use of Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands.	General vegetation	Ground cover would increase, vegetation diversity and shrub density would increase, and there would be fewer introductions of noxious weeds and invasive plants in the project area.	Feedground activity would result in less litter, more elk feces and unconsumed hay, less shrub densities, and more introduction and subsequent treatment of noxious weeds and invasive plants.
	Sensitive plant species - Sweet flowered rock jasmine, Starveling milkvetch, Wyoming tansymustard, Rockcress draba, Narrowleaf goldenweed, Payson's bladderpod, Creeping twinpod, Whitebark pine	No impact	No impact

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
	Sensitive plant species - Pink agoseris, Payson's milkvetch, Greenland primrose and Soft aster.	May impact individuals but is not likely to cause a trend to federal listing or loss of viability.	May impact individuals but is not likely to cause a trend to federal listing or loss of viability.
	MIS plant species - Boreal draba.	A more mobile elk herd would be likely trample, browse and alter boreal draba habitat.	A concentrated elk herd would be less likely trample, browse and alter boreal draba habitat.
	MIS plant species - Aspen	Aspen are preferred browse for elk. Portions of the Corridor Analysis Area would be in contradiction of the Aspen Management Guideline.	Aspen are preferred browse for elk. Portions of the project area, analysis area and Corridor Analysis Area would be in contradiction of the Aspen Management Guideline.
Hydrology Resources			
Use of the Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in willow stands associated with riparian/wetlands.	Wetlands/Riparian Areas	An improvement in riparian vegetation would occur on a 1.2 acre portion of the project area that is currently trampled during times when wetlands have bare soil exposed. There would be no notable change in willow conditions in the feedground. New elk pellet concentrations would not accumulate on-site, reducing the potential for nutrient and bacteria enrichment in the 2.9 acres of feeding area wetlands. Riparian vegetation around the wetlands	No notable impacts to willows within the feedground are currently occurring and this condition would continue. Residual hay would continue to attract elk to the feedground after snowmelt, allowing for continued use of the feedground and prolonged impact to water resources during and after snowmelt and ground thaw.

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
		would improve in condition, especially in dry years, and there would be less potential for water quality degradation from livestock fecal matter in the vicinity of the wetlands. This alternative would improve water quality, wetlands, and riparian vegetative communities.	
Use of Alkali Creek feedground concentrates elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via sediment delivery and increased water temperatures.	Stream Bank Alteration	This alternative would reduce concentrated elk trailing that is currently occurring along Alkali Creek. Stream channel conditions and elevated sediment levels would improve over a period of five to twenty years.	Elk would continue to trail across Alkali Creek to reach the feedground, resulting in no improvement to existing conditions along Alkali Creek. Degraded channel condition, altered channel function, and elevated sediment delivery to the stream would continue. Conditions along the Gros Ventre River associated with the feedground would remain unchanged.
Fishery/Amphibian Resources			
Use of Alkali Creek feedground concentrates the elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by	Snake River Cutthroat Trout	Beneficial Impact	May impact individuals or habitat but is not likely to trend towards federal listing or cause a loss of viability.
	Rainbow Trout	Beneficial Impact	May impact individuals or habitat but is not likely to trend towards federal listing or cause a loss of viability.
	Boreal Toad	Beneficial Impact	May impact individuals but not likely to trend toward federal listing.

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
bank instability via sediment delivery and increased water temperatures.	Boreal Chorus Frog	May impact individuals but is not likely to contribute to federal listing or loss of population viability.	May impact individuals but not likely to trend toward federal listing.
	Columbia Spotted Frog	May impact individuals but is not likely to contribute to federal listing or loss of population viability.	May impact individuals but not likely to trend toward federal listing.
Wildlife Resources			
Use of Alkali Creek feedground could impact elk, wolves, Canada lynx, grizzly bears, greater sage-grouse, martens, Peregrine falcons, great gray owls, boreal owls, and northern goshawks, wolverines, and other wildlife, many that use meadows, sagebrush, aspen, and riparian habitat.	Grizzly bear	May affect, not likely to adversely affect.	May affect, not likely to adversely affect.
	Canada lynx and Revised Designated Critical Lynx Habitat	No impact	May affect, not likely to adversely affect.
	Wolverine	Will not jeopardize the continued existence of the species.	Will not jeopardize the continued existence of the species.
	Gray Wolf	No impact	Beneficial impact
	Sage-grouse	No impact	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.
	North American Marten	Positive effects by improving conditions for their prey,	Degraded habitat conditions for marten prey in the vicinity (less than 720 meters) of the feedground site, but the prime habitat upslope of the feedground would be little affected.
	Bighorn sheep	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
	Elk	No effect on elk numbers; improvement in habitat conditions near the Alkali Creek feedground.	No effects on elk numbers; continued negative effect on habitat conditions near the Alkali Creek feedground.
	Mule Deer, Moose and Pronghorn	Some minor changes in the spatial distribution of herbivory and habitat conditions in the corridor analysis area would occur as a result of elk shifting to other feedgrounds. No effect to population trends of mule deer, moose, and pronghorn within their respective herd units.	For moose and mule deer, this alternative contributes negatively toward achieving the herd objectives because it creates less favorable habitat conditions (less woody browse) for the two species, near the feedground .This alternative improves pronghorn habitat conditions by impeding development of deciduous woody vegetation, contributing positively to the desired population trend.
	Peregrine falcon, great gray owl, boreal owl, and northern goshawk	Beneficial impact	May impact individuals or habitat but not likely to contribute to a trend towards federal listing or cause a loss of viability to the population or species.
	Brewer's Sparrow	Because of the improved acreage and condition of sagebrush, the No Action alternative would contribute positively, but slightly, to population increases of Brewer's sparrows on the corridor analysis area and the BTNF.	The proposed action would carry negative effects on the height and breadth of individual sagebrush plants and the coverage of sagebrush in the corridor analysis area, with effects most visible near the feedground. Elk herbivory and trampling would affect sagebrush and decrease residual (over-winter) herbaceous vegetation such as grasses and forbs needed by insect prey of the sparrows during the subsequent breeding (spring) and brood-rearing (summer) season. This

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
			would likely reduce, albeit slightly, numbers of Brewer's sparrows on the analysis area and the BTNF.
	Migratory birds	Minor positive effects on habitat and populations of Calliope hummingbird, Willow flycatcher, Loggerhead shrike and Sage thrasher at the scale of the analysis area and the BTNF.	Minor negative effects on habitat and populations of Calliope hummingbird, Lewis's Woodpecker, Williamson's sapsucker, Olive-sided flycatcher, Willow flycatcher, Loggerhead shrike and Sage thrasher at the scale of the analysis area and the BTNF.
Wilderness and Wild and Scenic Rivers			
Use of Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands. These vegetation impacts could affect wilderness character in the Gros Ventre Wilderness, outstandingly remarkable values (ORVs) in the Gros Ventre Wild and Scenic River Corridor,	Wilderness	Slight improvement in the natural, untrammeled, and undeveloped qualities of wilderness character.	Slight negative effect on the natural, untrammeled, and undeveloped qualities of wilderness character.
	Wild and Scenic River	No effect	No effect

Issue	Indicator/Variable/ Element	Alternative 1	Alternative 2
Climate Change			
Climate is one of the primary drivers of the physical and ecological processes that determine the distribution, structure, and function of ecosystems.	Carbon	No effect	No effect

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on the surrounding environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

The **project area** includes the 91-acre area proposed to be permitted for Alkali Creek feedground. Environmental effects are also typically described within either the **analysis area** or the **corridor analysis area.** The **analysis area** is an area of about 3,000 acres within an approximate one-mile radius of the feedground boundary. The **corridor** analysis area extends from the Forest boundary near Turpin Creek up the Gros Ventre River to Fish Creek feedground and it encompasses 19,700 acres (Figure 5). Although most effects of herbivory associated with Alkali Creek feedground operations were localized within the **analysis area**, the **corridor analysis area** encompasses the related effects of elk that travel between feedgrounds in the Gros Ventre watershed and occasionally to the National Elk Refuge. A larger area, such as the entire Gros Ventre watershed is described for analysis of certain resources when identified by the interdisciplinary team specialists.

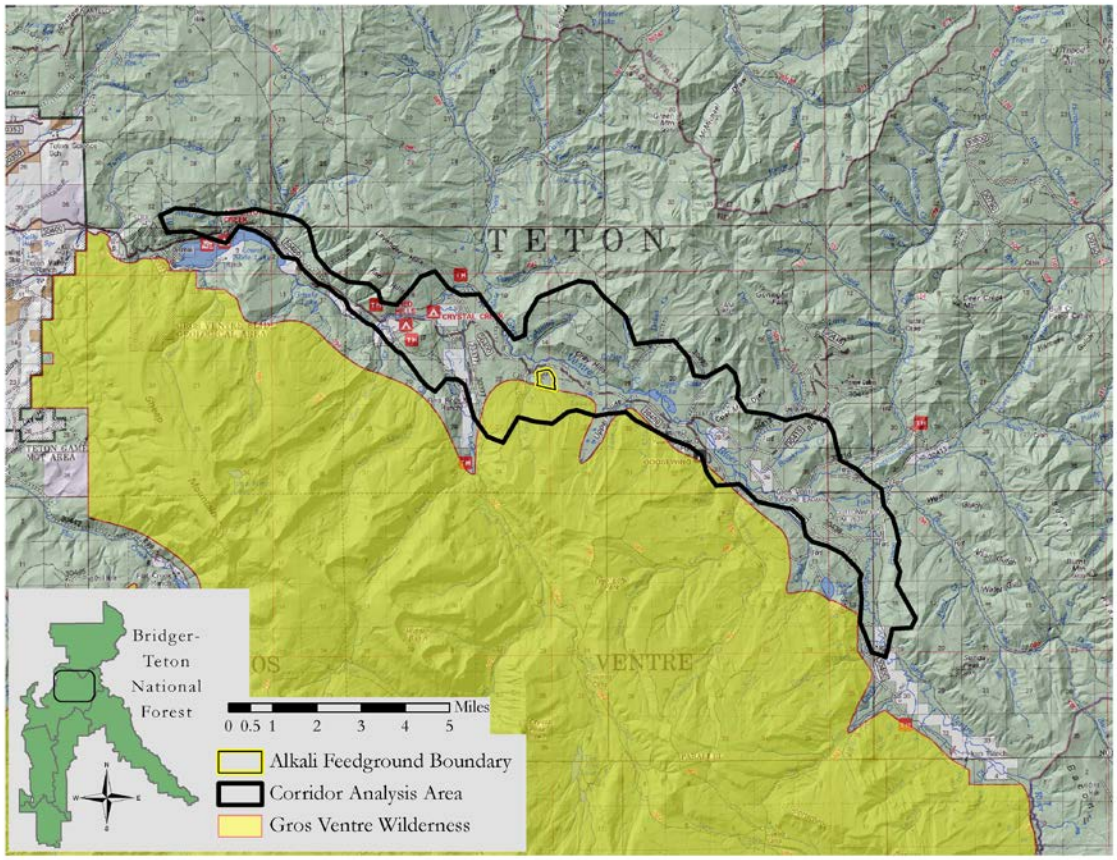

Figure 5: Corridor Analysis Area Boundary

Unless otherwise identified by team specialists, the temporal boundary for past, present, and reasonably foreseeable future activities considered in cumulative effects analyses is the period from about 30 years ago to about 15 years in the future. A list of actions considered in the cumulative effects analyses is found in Appendix 6.

Consideration of Available Science

The techniques and methodologies used in this analysis consider the best available scientific methods and information. Details concerning the analysis are documented in the specialist reports in the project record. The analysis includes a summary of the credible scientific evidence which is relevant to evaluating reasonably foreseeable impacts of the proposed action and alternatives. The analysis also identifies methods used and references the scientific sources relied upon. The conclusions are based on the scientific analysis that shows a thorough review of relevant scientific information. The analyses relied upon disclose areas where there is currently incomplete scientific information, and indicate ongoing efforts to gather information, however, none of the incomplete or unavailable information is necessary for the Forest Service decision regarding the use of National Forest System land for winter elk management activities on Alkali Creek feedground.

The relevant science considered for this analysis consists of several key elements:

- On-site data and history;
- Scientific literature;
- Modeling using currently acceptable analysis;
- The collective knowledge of the project area by interdisciplinary team members through integration of science with local conditions; and
- Comparative analysis considering other similar projects and past monitoring data.

The determinations reached in this analysis are based upon ground reconnaissance of the proposed project and analysis area, previous monitoring of similar types of activities on National Forest System lands, and a review of the literature that is cited in the specialist reports. The project area was surveyed and data was collected in the past seven years using water quality/watershed monitoring information, riparian inventory, vegetation inventory and soil survey information. The use of Best Management Practices (mitigation measures) concerning water quality is addressed in this analysis. Relevant literature indicates that Best Management Practices are effective in protecting water quality and long term soil productivity. Experience gained from implementation of livestock grazing plans and through observations of impacts of elk feedgrounds over the past decades has been incorporated into the analysis. The effects to resources in other similar projects in the area have been considered in the analysis.

Resource specialists determined that the potential effects of this project are predictable and well documented with no significant scientific uncertainties or risks associated with this proposal.

Soils

Information provided in this draft supplemental environmental impact statement about the soil resources of the project area is excerpted from the *Soil Resource Report* by Forest Soil Scientist Eric Winthers.

Issues to be Addressed

Issue #1. High concentrations of elk on Alkali Creek feedground could cause soil compaction and/or increased erosion that may affect soil quality.

Indicators

Two indicators chosen to measure this issue were:

- Amount of soil compaction in the activity area that is estimated to negatively impact long-term soil functions to support desired vegetative growth.
- Amount of observable soil loss within the activity area.

A third indicator of detrimental soil disturbance was used to estimate soil conditions across the activity area. This indicator was chosen for the project area to provide a measure of degree of soil quality disturbance. It is an indicator to identify possible mitigation measures or design features that may be needed for the alternatives. This indicator was not used as a mandatory requirement for this project.

AFFECTED ENVIRONMENT

Soil quality was assessed and analyzed by activity areas for each indicator and alternative. The activity areas were:

1. Project Area. This Activity Area was used to estimate existing conditions, direct and indirect effects of alternatives. The area was chosen to best represent the proposed action potential effects to soil quality and soil resources (approximately 91 acres).
2. Analysis Area - approximately one mile from the perimeter of permitted feed ground. This Activity Area was chosen for analysis of potential cumulative effects. During project planning resource specialists noted that the vegetative impacts of browsing were noticeable (in decreasing magnitude) up to approximately one mile from the feedground. The area of vegetation impacts would correlate to the area of soil impacts, since soil impacts are related to compaction from concentrated elk use (approximately 3062 acres).

Methods

In order to measure the indicators of soil compaction, soil loss, and amount of detrimental soil disturbance an assessment of the Alkali Creek feedground was conducted on August 21, 2007. The assessment was completed using the methods similar to those found in Page-Dumroese et al. 2009 and Napper et al. 2009. Per the protocol an activity area was defined as the feedground boundary and the transect was conducted within the activity area at random azimuths with fixed intervals (see project record for activity area map and transect location). Within the feed ground

and along the transect, representative soil profiles were dug and described and soil samples were collected to determine bulk density. The bulk density samples were later used to validate and support professional judgment of soil quality condition, specifically compaction, and to determine detrimental disturbance.

Soil Compaction

This impact occurs in response to pressure (weight per unit area) exerted by machinery or animals. The risk for compaction is greatest when soils are wet. Soil compaction negatively affects vegetation by reducing the uptake of water and nutrients, reducing plant vigor. Compaction also decreases infiltration and thus increases runoff and the hazard of water erosion (NRCS 1996). Grazing by large animals such as elk and cattle can cause compaction because their hooves have a relatively small area and therefore exert a high pressure. Platy soil structure[1] and high penetration resistance are the primary indicators of compaction. Soil scientists measured compaction on the feedground by digging soil pits and observing soil structure, plant rooting, and penetration resistance, and collecting bulk density[2] samples.

Active Erosion

Erosion is the detachment and transport of individual soil particles, or aggregates of particles, by wind, water, or gravity. Management practices may increase the hazard of soil erosion when ground cover is removed and soil particles are detached. Surface or particulate erosion occurs as the loss of soil by gravity (dry ravel), by wind, or by gravity and water, including raindrop splash and overland flow (rill and/or sheet erosion). Mass wasting occurs when large masses of soil and/or rock fall, slide, or flow down a slope. Indicators of erosion include pedestaling[3] of plants, presence of rills and gullies, exposed roots, and lichen lines on rocks.

Detrimental Soil Disturbance

Detrimental Soil Disturbance: This includes areas where one meter by one meter or larger exhibits detrimentally displaced soil as described below:

> (a) The loss of either five centimeters or ½ of the humus enriched top soil (A horizon), whichever is less, or
>
> (b) The exceeding of the soil loss tolerance value for the specific soil type.

Detrimental Soil Compaction: Soil compaction is generally evaluated from five to thirty centimeters below the mineral soil surface. Specific depths for measurement are dependent upon soil type and management activities. Detrimental soil compaction is increased soil density (weight per unit volume) and strength that restricts root growth, reduces soil aeration and inhibits

[1] In platy soil structure, the soil units are flat and plate-like. They are generally oriented horizontally. Platy structure is usually found in subsurface soils that have been subject to leaching or compaction by animals or machinery. Platy structure tends to impede the downward movement of water and plant roots through the soil.

[2] Soil weight is referred to as soil bulk density. Density is the mass of material contained within a given volume.

[3] Pedestaling is a condition where the soil has eroded from around individual plants, leaving them on small pedestals of soil.

water movement. Measurements of potential detrimental soil compaction may be qualitative or quantitative.

The guideline stating that no more than 15 percent of an activity area should have detrimentally disturbed soil is used in this analysis as a threshold to determine when management activities should include mitigation and restoration. Fifteen percent has been used historically as an indicator that represents the level at which a significant change can be detected given the variability of the soil resource.

The following "Disturbance Classes" are based on visual observations made at each point along each transect:

- Class 0 indicates that no disturbance has occurred
- Class I indicates that compaction in the surface layer is greater than that observed under natural conditions and erosion is minimal.
- Class II indicates that increased compaction is present in the 10–30 centimeter range, platy structure is generally continuous, large roots may penetrate the platy structure, but fine and medium roots may not.
- Class III indicates that compaction is continuous deep in the soil profile (more than 30 centimeters). Erosion and other signs of soil movement are evident. Platy structure is continuous and large roots do not penetrate (USFS 2007).

Corral **Thick organic surface horizon**

Figure 6: Alkali Creek Feedground Soil Photographs

At the Alkali Creek feedground, sheds are located and direct feeding occurs on National Forest System land. The soil profile description was classified as a coarse-loamy, mixed, superactive, xeric haplocryalf. Soils at this feedground are affected by compaction from elk, horses, and cross country use of the hay wagon. Detrimental soil disturbance in the activity area (feedground) identified is 8 percent (80 percent confidence interval). The main detrimental soil condition was compaction as identified by strong platy structure and verified by bulk density samples.

The table below summarizes the results of soil disturbance transects at Alkali Creek feedground. Detrimental soil disturbance was identified on 7.3 acres of the permitted feedground activity area. Detailed transect results are available in the *Soils Resources Report* in the project record.

Table 5: Percent of Each Disturbance Class and Percent Detrimental Disturbance

Feedground	Class 0	Class I	Class II	Class III	% Detrimental Disturbance	n @ 80% C.I.
Alkali Creek	0%	22%	78%	0%	8%	49%

All of the sites where feeding occurs directly on National Forest System lands had a noticeably thick organic surface horizon due to manure inputs. This layer ranges from about six to ten centimeters and was noted, but not considered detrimental to soil resource condition. The soil resources in the activity area are moderately compacted due to the current use as an elk feedground, plus cumulative effects from other uses such as cattle grazing. No soil displacement was observed.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action Alternative)

Direct and Indirect Effects

With the removal of the feed and associated infrastructure, elk would no longer be attracted to Alkali Creek feedground and the direct effect of concentrated use by elk and feeding operations would cease. Soils within the project area would gradually recover over a period of five to ten years. Research conducted by Page-Dumrose et al. (2006) on soils compacted by machinery concluded that five years after treatment compaction dissipated over time and bulk density values returned to pretreatment conditions as the vegetation was allowed to returned to its natural condition. Soil displacement is not currently above natural erosion levels and would not be expected to increase.

Indirect effects of Alternative 1 include the potential for increase soil compaction on the nearby Patrol Cabin and Fish Creek feedgrounds. Elk displaced from the Alkali Creek feedground would likely use Patrol Cabin and Fish Creek feedground. As a result the increased use by elk on those feedgrounds could cause an increase in the amount of soils with detrimental soil disturbance.

Cumulative Effects

Potential cumulative effects related to soil resources for the Winter Elk Management Activities Special Use Permit Proposal were considered within the activity area defined as land within approximately one mile of the Alkali Creek feedground perimeter. This area was chosen for analysis of potential cumulative effects because resource specialists noted that the vegetative

impacts of browsing were noticeable (in decreasing magnitude) up to approximately one mile from the feedground. The area of vegetation impacts would correlate to the area of soil impacts, since soil impacts are related to compaction from concentrated elk use.

Past, present, and reasonably foreseeable management actions that could compact or erode soil resources in the analysis area include livestock grazing, vehicular use on roads, off-road vehicle use, recreation trails, wildlife and livestock trailing, and dispersed camping. Off-road vehicle use and cross country foot travel related to antler hunting in May and June is another action that affects soil resources within the area within and adjacent to feedgrounds. The table below displays data about management actions.

Table 6: Information Related to Soils Resources Considered in the Cumulative Effects Analysis

Acres of National Forest System Lands within the Project Area	**0 Acres Alt 1 91 Acres Alt 2**
Acres of National Forest System lands within the analysis area	3,062 acres
Acres of active grazing allotments within the analysis area	1,179 acres
Miles of roads within the analysis area	4.7 miles
Miles of trail within the analysis area	1.3 miles
Dispersed recreation and camping or used for administrative uses	Alkali Creek feedground is adjacent to a lightly used trailhead and is used as a camping location for the livestock permittee.

Detrimental soil disturbance is a concern because it reduces the productivity of the land and affects water quality. The detrimental soil disturbance analysis described in the Affected Environment section of this report includes the combination of effects of all management actions within the permitted use activity area. This includes impacts from winter elk management, livestock grazing, dispersed camping use, and motorized and non-motorized travel on and off roads and trails. Impacts to soil resources beyond the permitted use activity area were observed to decrease with increased distance from the permitted feedground. The estimated percent of areal soil loss, soil compaction and detrimental disturbance within the area assessed for cumulative effects is less than the permitted feedground activity area.

While soil conditions under Alternative 1 would improve in 5 to 10 years in the project area, detrimental soil disturbance may increase on Patrol Cabin and Fish Creek feedgrounds due to large numbers of elk spending more time on those feedgrounds in the absence of feeding at Alkali Creek. However, the combined effects of this alternative with past, present and proposed actions in the analysis area would not combine to produce cumulative effects to soil resources that exceed Forest Plan direction on the two remaining feedgrounds. While past, present and

future cumulative actions would continue in the Alkali Creek analysis area, the minor beneficial effects of stopping feeding at Alkali Creek would not substantially offset the negative effects of off-road vehicles, livestock grazing and dispersed camping.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Direct and Indirect Effects

Continuing winter elk management activities on the feed ground would likely maintain the current level of impacts as disclosed in the Affected Environment section. Given that the feedground has been in operation since the mid-1960s it is unlikely that with the direct effects of concentrated use by elk on soils would change, unless the numbers of elk were to increase. Use of the feedground in the winter also provides some protection against compaction since the soils are likely to be frozen or covered by snow.

Cumulative Effects

As stated above, the detrimental soil disturbance analysis described in the Affected Environment section of this report includes the combination of effects of all management actions within the permitted use activity area. This includes impacts from winter elk management, livestock grazing, dispersed camping use, and motorized and non-motorized travel on and off roads and trails. Impacts to soil resources beyond the permitted use activity area were observed to decrease with increased distance from the permitted feedground. The combined effects of this alternative with past, present and proposed actions in the analysis area do not combine to produce cumulative effects to soil resources that exceed Forest Plan direction.

Vegetation Resources

Information provided in this draft supplemental environmental impact statement about the plant resources of the project area is excerpted from the *Alkali Winter Elk Feedground SEIS Botany Report and Biological Evaluation* by Botanist Tyler D. Johnson, *A Technical Report on Elk Feedground Vegetation Effects* (WGFD 2007 and 2011). These reports are incorporated by reference in their entirety.

Issues to be Addressed

Issue #2. Use of Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands. [These vegetation impacts could affect wilderness qualities in the Gros Ventre Wilderness, outstandingly remarkable values (ORVs) in the Gros Ventre Wild and Scenic River Corridor, and/or pronghorn migration. These last impacts are analyzed under the Wilderness and Wild and Scenic Rivers and Wildlife sections.] Alternatives are compared in this analysis by a narrative describing the expected vegetation changes and by a comparison of acres affected by alternative.

Indicator

The following analysis indicator is used to measure the differences in alternatives: acres of potential sensitive or MIS species habitat within the analysis area.

AFFECTED ENVIRONMENT

The areas used to evaluate the effects of the alternatives for vegetation species are the project area, the one-mile analysis area and the corridor analysis area. Within these areas the vegetation community consists of sagebrush shrubland, grassland, aspen forest, conifer forest, riparian communities, and barren or sparsely vegetated areas. The project area has an elevation range of approximately 7,200 to 8,400 feet. Vegetation types within the three areas are displayed in Figures 7 and 8. These types were identified in a mid-scale mapping project completed in 2007.

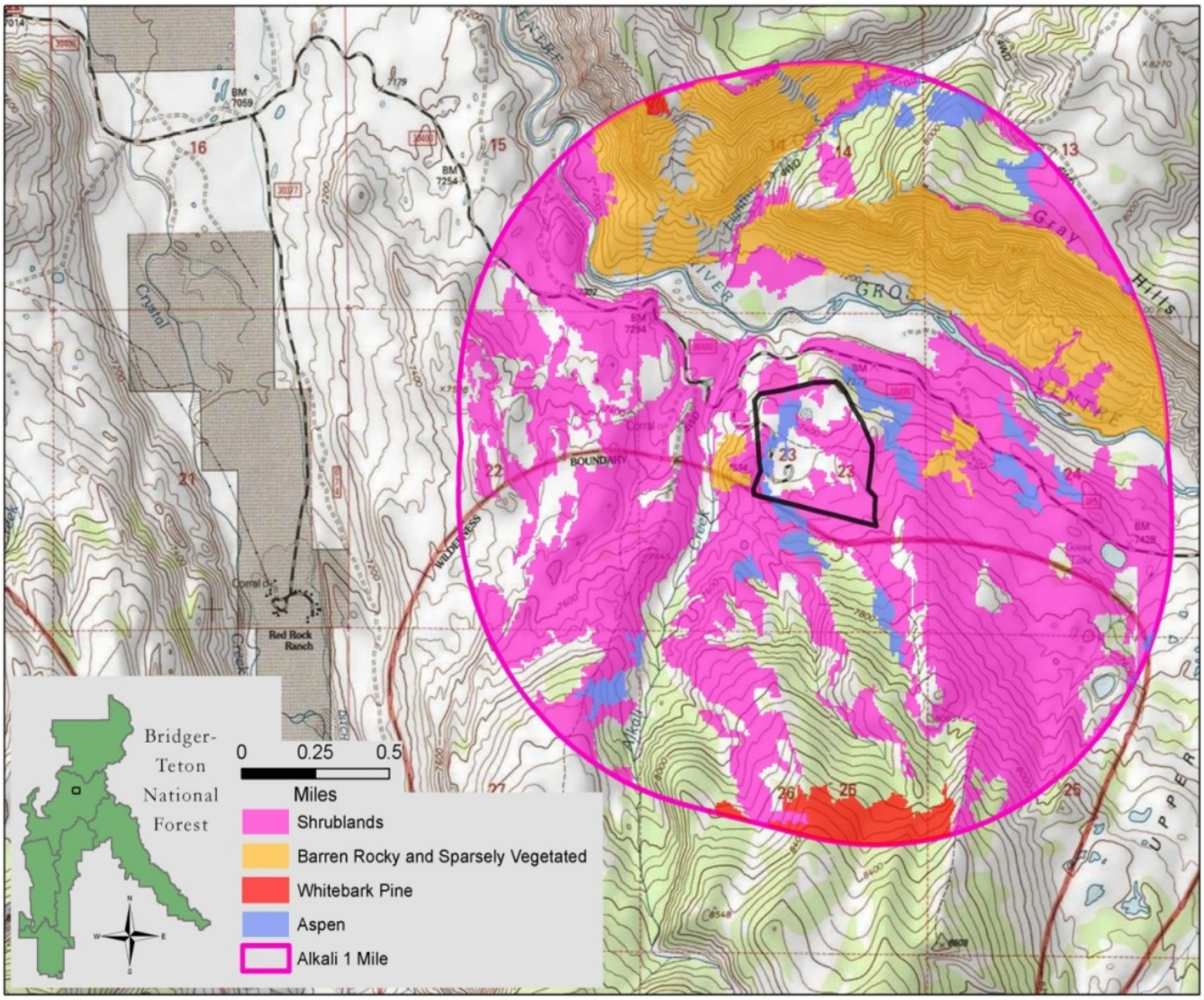

Figure 7: Distribution of Certain Vegetation Types within the Analysis Area

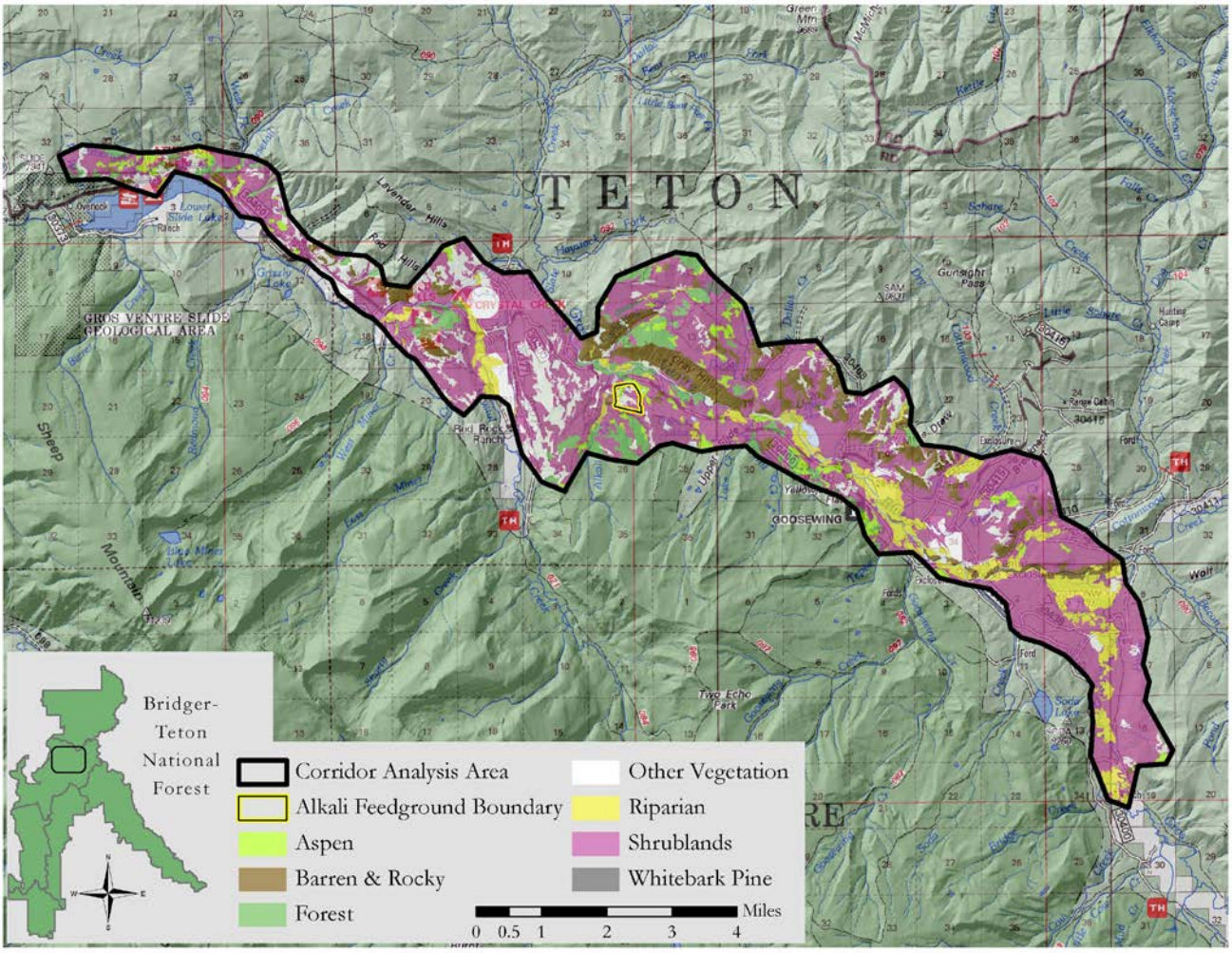

Figure 8: Vegetation Types in the Gros Ventre Corridor Analysis Area

Species Richness and Diversity

Assessments of vegetative impacts from winter elk management in the project area and in the corridor analysis area suggest that where elk are fed, native vegetation species richness and diversity are reduced, and occurrence and production of exotic grass species (e.g., smooth brome, *Bromus inermis*) is increased. (Dean and Hornberger 2006) Shrubs of low palatability (e.g., sagebrush, *Artemesia spp*.) are typically killed and excluded from feedgrounds by repetitive crushing or trampling from trucks/trailers, horses/feed sleighs, and/or elk. Shrubs (e.g., serviceberry, *Amelancher alnifolia*) and trees (e.g., aspen, *Populus tremuloides*) of greater palatability are often stunted or killed from intense browsing and trampling. Figure 9 displays photographs of vegetation alternation at Alkali Creek feedground. Although moderate accumulation of litter (feces, unconsumed hay) can fertilize and stimulate plant growth, deep accumulation is sometimes present on various areas within feedgrounds, inhibiting vegetation diversity and productivity. Feedgrounds with relatively small feeding areas, high numbers of elk, and long feeding seasons typically have larger areas of deep litter accumulation. Vegetative

impacts are diminished on sites where winter elk management has been discontinued for 20 to 30 years (Dean and Hornberger 2006).

Effects on vegetation **Aspen stand in feedground**

Figure 9: Alkali Creek Feedground

Alkali Creek feedground is located near water and casual observations suggest that it experiences an increase in herbaceous production from increased fertilization due to moderate accumulations of concentrated elk feces. These aspects contribute to make the site attractive for cattle grazing. Alkali Creek feedground is within the Upper Gros Ventre Allotment where up to 550 animal unit months are permitted each year. The feedground is not fenced, thus, observed impacts to vegetation on the feedground are due to both summer grazing by both livestock and wildlife and winter elk management operations.

High duration and/or high frequency grazing by livestock can substantially alter vegetation communities (Belsky et al. 1999) and reduce species richness (Fleischner 1994). High duration and/or high frequency grazing by native ungulates on herbaceous vegetation can alter species composition (Kay and Bartos 2000) and increase dominance by exotic grasses (Kay 1990, from Kay and Bartos 2000). Areas within any vegetation community that receives frequent disturbances typically have altered often reduced, species richness and diversity (Dale et al. 2000).

A study of feedgrounds on the Bridger-Teton National Forest, including Alkali Creek feedground, was performed in 2006. The study determined that, although observed species richness did not statistically differ, there were greater numbers of grass, forb, and shrub species encountered on reference (undisturbed) sites than feedground (disturbed) sites (Dean and Hornberger 2006).

Ground Cover

Previous research has shown that on sites within aspen/sagebrush ecotypes, litter (primarily plant matter) increases with exclusion of grazing/browsing by native ungulates and livestock (Kay and Bartos 2000). On feedgrounds, however, qualitative visual observations have suggested that areas on some feedgrounds have extreme loads of litter (i.e., elk feces, unconsumed hay)

resulting from numerous years of deposition. Excessive deposits of litter may preclude growth of some vegetation species, reduce species richness and diversity, and provide conditions where some vegetation species (i.e., noxious and invasive weeds) can dominate (Dean and Hornberger 2006). These excessive deposits of litter due to winter elk management could exacerbate cumulative impacts from livestock grazing on riparian and adjacent areas (USFS 1990, pp 334).

Shrub Densities

Qualitative visual assessment of impacts to shrub communities on feedgrounds has suggested that winter elk management operations reduce or completely exclude shrubs from most areas on feedgrounds (Dean and Hornberger 2006). Sagebrush communities that receive chronic disturbances at short intervals typically have low densities of young shrubs or no shrubs at all, and are often converted to vegetation communities dominated by herbaceous, primarily grass, species.

Vegetation impacts to areas off of and adjacent to elk feedgrounds suggest that browsing of palatable shrubs and trees and consumption of herbaceous forage are extensive up to approximately one mile from the feedground, often impacting the seral-stage of vegetation communities (WGFD, unpublished data). Vegetation impacts based on visual estimation are generally limited to two kilometers from feedgrounds (Dean and Hornberger 2006).

Vegetation impacts on aspen are also limited to two kilometers from feedgrounds. Browse-use within this two-kilometer range surpassed 20 percent, and production of new sprouts (suckers) did not exceed 2,361 stems/hectare; 83 percent of these stems are less than one meter in height, suggesting low regeneration (WGFD 2011).

Noxious Weeds

Alkali Creek, and the other feedgrounds in the Gros Ventre, are high priorities for weed monitoring and treatment by Teton County Weed and Pest (TCWP) because of their isolation in a relatively weed-free drainage and the peripheral nature of the Gros Ventre to the rest of Jackson Hole (i.e., Jackson Hole is the weed "source"... the Gros Ventre being on the periphery of noxious weed range for Teton County). Noxious weeds that have been found at Alkali Creek feedground include thistles, black henbane at times, and three small infestations of leafy spurge. The black henbane has been treated and seems to be declining in presence. The leafy spurge has been treated aggressively with herbicides and seems to be stable to declining. Locations of all noxious weeds/patches are recorded with GPS and depicted on a GIS map (available from TCWP). Along with treatment, TCWP checks for weed spreading, especially along suspected corridors like the roads and riparian areas. They typically monitor and treat at Alkali Creek feedground twice per summer. These visits are usually in mid-June to early July and again in August. The treatment strategy is to use herbicide on the plants before they go to seed; if plants have gone to seed they remove seed heads physically and then treat with herbicide.

Table 7: Species with Potential Habitat or Known Individuals Present in the Corridor Analysis Area

Name	Habitat Description	Species Type	Known Occurrences in Project Area?	Habitat in analysis area (elevation range from 6800-8500 feet)?	Likelihood of effects from proposed and no action?
Agoseris lackschewitzii pink agoseris	This species is found in mid-montane to subalpine wet meadow, saturated soils at 8,500 to 10,600 feet in elevation (Fertig et al. 1994).	Sensitive	No	Yes - the riparian habitat of this species is present in the analysis area	Moderate - a supplemented and concentrated elk population moving through this species' riparian habitat could result in trampling and browsing
Androsace chamaejasme ssp. carinata sweet-flowered rock jasmine	This species is known in the east slope of the Wind River Range, eastern Absaroka Mountains and the Owl Creek Mountains. Preferred habitat is on exposed settings of rocky ridge crests, slopes with rock outcrops and thin soils of limestone or dolomite substrate at 8,500 to 10,800 feet elevation. (Fertig 2001a)	Sensitive	No	Yes - the barren and rocky habitat of this species is present within the analysis area	Low - a supplemented and concentrated elk population is unlikely to interact with this species' habitat
Astragalus jejunus var. jejunus Starveling milkvetch	Found on dry barren ridges and bluffs of shale and stone, clay or cobblestones at 6,000 to 7,100 feet elevation (Fertig et al. 1994).	Sensitive	No	Yes - the barren and rocky habitat of this species is present in analysis area	Low - a supplemented and concentrated elk population is unlikely to interact with this species' habitat
Astragalus paysonii Payson's milkvetch	This species occurs primarily in disturbed areas on sandy soils that have a low cover of forbs and grasses at elevations of 5,850 to 9,600 feet (Heidel 2008)	Sensitive	No	Yes- the forested and disturbed habitat of this species is present in the analysis area	Moderate - the concentration of elk could create habitat for this disturbance adapted species

Name	Habitat Description	Species Type	Known Occurrences in Project Area?	Habitat in analysis area (elevation range from 6800-8500 feet)?	Likelihood of effects from proposed and no action?
Descurainia torulosa Wyoming tansymustard	Restricted to the southern Absaroka Range and the Rock Springs Uplift. Habitat is sandy soil at the base of cliffs composed of volcanic breccia or sandstone, under slight overhangs, in cavities in the volcanic rock, or on ledges. It is found at elevations of 7,700 to 10,500 feet (Fertig 2000d).	Sensitive	No	Yes - the barren and rocky habitat of this species is present within the analysis area	Low - a supplemented and concentrated elk population is unlikely to interact with this species' habitat
Draba borealis boreal draba	Known in Wyoming from the southwestern Absaroka, western Wind River, Gros Ventre, Salt and Wyoming ranges, Jackson Hole and the Yellowstone Plateau. North-facing limestone, dolomite or volcanic slopes, cliffs and riparian areas from 6,200-8,500 (Fertig 1999)	Plan MIS	**YES**	Yes - both the riparian and rocky portions of this species' habitat is present in analysis area	Moderate - a supplemented and concentrated elk population moving through this species' riparian habitat could result in trampling and browsing
Draba globosa rockcress draba	Rockcress draba is found in moist, gravelly alpine meadows and talus slopes, often on limestone-derived soils. Found from 8,100 to 12,400 feet (Handley 2008).	Sensitive	No	Yes - the barren and rocky habitat of this species is present within the analysis area	Low - a supplemented and concentrated elk population is unlikely to interact with this species' habitat
Ericameria discoidea var. linearis narrowleaf goldenweed	This species is typically found in semi-barren, whitish clay flats and slopes, gravel bars, and sandy lakeshores at elevations of 7,700 to 10,300 feet (Fertig 2000e).	Sensitive	**Known occurrence within 1,200 feet of analysis area**	Yes - the barren and rocky habitat of this species is present within the analysis area	Low - a supplemented and concentrated elk population is unlikely to interact with this species' habitat

Name	Habitat Description	Species Type	Known Occurrences in Project Area?	Habitat in analysis area (elevation range from 6800-8500 feet)?	Likelihood of effects from proposed and no action?
Lesquerella paysonii Payson's bladderpod	This species is endemic to the carbonate mountain ranges of west-central Wyoming, eastern Idaho, and southwestern Montana. It is found on rocky, sparsely-vegetated slopes, often calcareous substrates at elevations of 5,500 to 10,600 feet (Heidel 2008a).	Sensitive	**YES**	Yes - the barren and rocky habitat of this species is present in analysis area	Low - a supplemented and concentrated elk population is unlikely to interact with this species' habitat
Physaria integrifolia var. monticola creeping twinpod	Found on barren, rocky, calcareous hills and slopes at 6,500 to 8,600 feet elevation (Fertig et al. 1994).	Sensitive	**Known occurrence within 600 feet of analysis area**	Yes - the barren and rocky habitat of this species is present within the analysis area	Low - a supplemented and concentrated elk population is unlikely to interact with this species' habitat
Pinus albicaulis whitebark pine	This species grows in pure stands near the treeline and in mixed stands in subalpine forests from under 8,000 to over 10,000 feet in Wyoming.	Sensitive	**YES**	Yes- The forested habitat of this species is present in the analysis area	Low - a supplemented and concentrated elk population is unlikely to interact with this species' habitat since whitebark pine are not forage for wild ungulates
Populus tremuloides aspen	Aspen can be found throughout the Bridger-Teton. It occurs in pure stands, or mixed with subalpine fir, lodgepole pine, Douglas-fir, whitebark pine, or Engelmann spruce. In lower elevations, it forms a mosaic with shrublands.	Ecological MIS	**YES**	Yes- The forested habitat of this species is present in the analysis area	High - Aspen are preferred browse for elk

Name	Habitat Description	Species Type	Known Occurrences in Project Area?	Habitat in analysis area (elevation range from 6800-8500 feet)?	Likelihood of effects from proposed and no action?
Primula egalikensis Greenland primrose	This species is found in wet meadows along streams and calcareous montane bogs from 6,600 to 8,000 ft (Fertig et al. 1994).	Sensitive	No	Yes - the riparian habitat of this species is present in the analysis area	Moderate - a supplemented and concentrated elk population moving through this species' riparian habitat could result in trampling and browsing
Symphyotrichum molle soft aster	In Wyoming, this species has been found in the Big Horn Mts and Hoback Canyon. It prefers sagebrush grasslands and mountain meadows in calcareous soils at 6,400 to 8,500 feet elevation (Fertig et al. 1994).	Sensitive	No	Yes - the shrubland habitat of this species is present and accounts for the majority of vegetative cover in the analysis area	Moderate- the majority of the habitat in which elk are fed and move between feedground occurs in this habitat type, trampling and browsing are possible

Forest Service Sensitive and Management Indicator Species (MIS)

There are six plant species with analysis requirements which are known to be present in or around the corridor analysis area, two of which are MIS and four are Forest Service Sensitive Species. In addition, eight other species with analysis requirements have potential habitat present in the corridor analysis area with no known occurrences, one of which is a MIS. All species were analyzed for the presence of their potential habitat in the project area. Species without potential habitat in the project area are considered to have a lack of suitable habitat and the activities would have "n**o impact"** to those species. There are 11 species which meet the criteria for no impact because the analysis area does not contain suitable habitat. A list of all species considered and reasons for dismissing them from detailed analysis is found in the *Botany Specialist Report* in the project record. The species carried forward in the analysis are listed above in Table 7 and below in Figure .

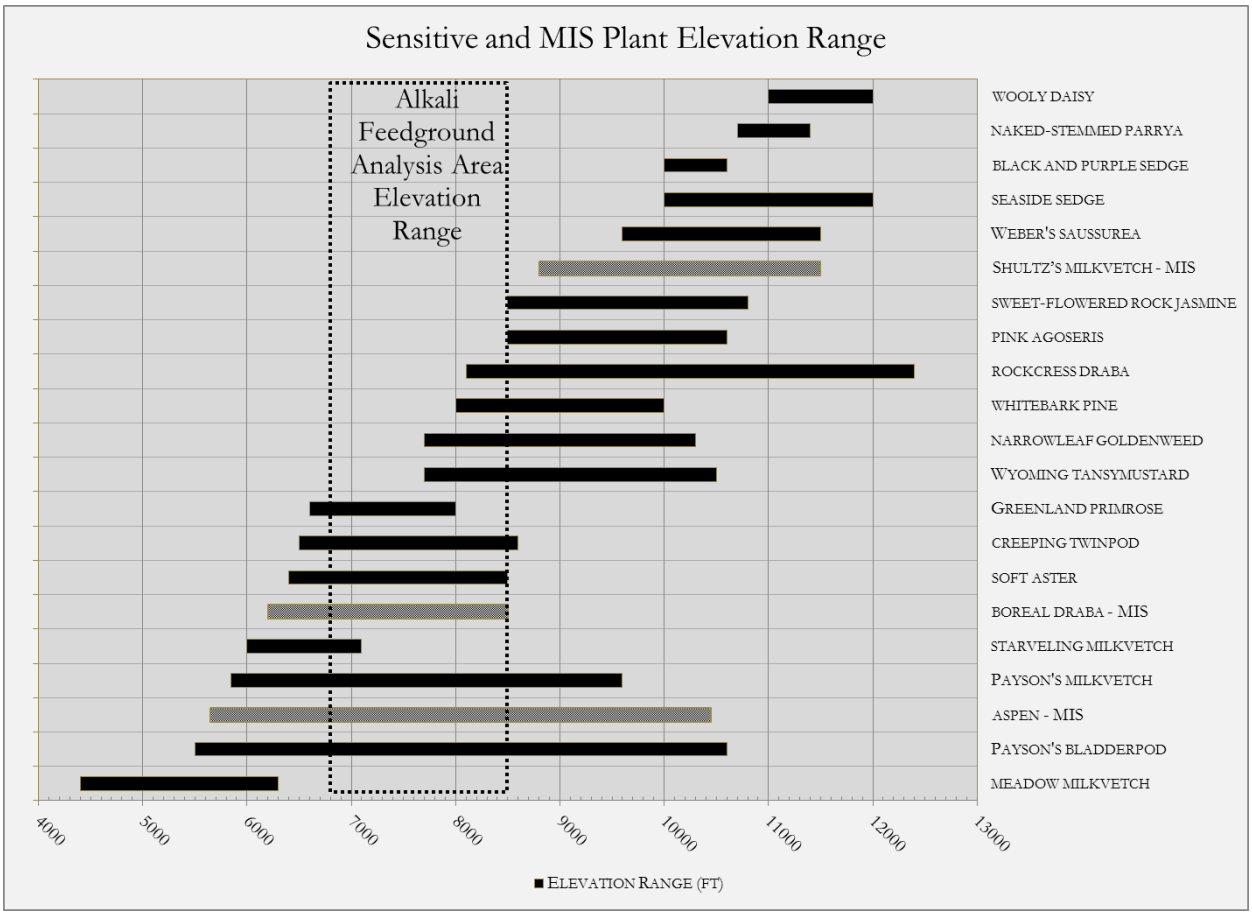

Figure 10: Elevation Range of Forest Service Sensitive Species and MIS Plants on the BTNF and Elevation Range of the Corridor Analysis Area

The elevation range of the corridor analysis area is 6,800-8,500 feet. All species were analyzed for the presence of their potential habitat in the analysis area. Table 8 displays the vegetation

types surrounding Alkali Creek feedground and the sensitive or management indicator plant species associated with each vegetation type.

Table 8: Vegetation Types and the Forest Service Sensitive or MIS Plants That Are Associated with Them

Group	Acres	% of total	Forest Service Sensitive or MIS Species associated with this habitat type within the elevation range of the analysis area
Barren & Rocky	1,924	9.8%	Starveling milkvetch, Payson's milkvetch†, Wyoming tansymustard, boreal draba‡, rockcress draba, narrowleaf goldenweed, Payson's bladderpod, creeping twinpod, sweet-flowered rock jasmine
Forested	1,971	10.0%	Payson's milkvetch†, whitebark pine, aspen
Aspen	642	3.1%	Aspen
Whitebark Pine	52	0.3%	Whitebark pine
Riparian	1,793	9.1%	Pink agoseris, Boreal draba‡, Greenland primrose
Shrubland	11,451	58.1%	Soft aster
OTHER*	2,579	13.1%	NONE

† Payson's milkvetch occupies both forested habitats and the bare areas created when those habitats are disturbed; as such it is included in both groups.

‡ Boreal draba occupies rocky cliffs and slopes as well as riparian areas; as such it is included in both groups.
*Vegetation types included here are water, urban / developed, agriculture, grassland / forbland, and tall forbland none of which are habitat for any sensitive or MIS species.

Plant Species Known to Occur in the Analysis Area

Boreal draba (*Draba borealis*) – MIS: Boreal draba is known from two occurrences that lie along the outline of the analysis area. The habitat for these occurrences is described as seep areas on lower slopes. Boreal draba is a species generally found in the boreal region and grows from Asia to Alaska and has disjunct populations in Wyoming and Colorado. This species grows on rocky slopes, cliffs and riparian areas on rocky soils. (Ferttig 1999) The plants that grow in rocky wetland habitats may be affected by elk feeding, and the movement of elk between feedgrounds may also impact the species.

Narrowleaf goldenweed (*Ericameria discoidea* var. *linearis*) – Sensitive: Narrowleaf goldenweed is known from 1,200 feet of the analysis area along a road which runs up a tributary of the Gros Ventre River. This occurrence is within an area where elk may be present as they move between feedgrounds. This species is a regional endemic which grows in dry sandy or cobblestone terraces above large streams and lakeshores. These areas are sparsely vegetated and this species appears to not be a preferred browse and may increase with low levels of disturbance (Fertig 2000).

Payson's bladderpod (*Lesquerella paysonii*) – Sensitive: This species is known from the lower Slide Lake area of the analysis area. This occurrence has a large spatial inaccuracy (collection is from 1977) and may or may not be present in the analysis area. Payson's bladderpod is found on rocky and sparsely vegetated areas across a fairly wide elevational range. Recent surveys for Payson's bladderpod have shown that it occupies areas that are naturally low in vegetative cover, such as talus slopes, but also grows in pipeline corridors and on exposed ridge-tops which have been recently bladed (Heidel 2012). The open and barren nature of this species' habitat and its possible interaction with disturbance means that invasive plants may be a threat. The movement of elk between feedgrounds may create such disturbance.

Creeping twinpod (*Physaria integrifolia* var. *monticola*) – Sensitive: Creeping twinpod grows in barren and rocky areas and is known from 1,000 feet of the analysis area. This occurrence is described as growing along a sagebrush slope along the Gros Ventre River. The species is not tracked by the Wyoming Natural Diversity Database (WYNDD) because of questions of taxonomy. The *Flora of North America* treatment of *Physaria* (eFloras 2012) includes the species *integrifolia* but emphasizes that the variety *monticola* is not valid. The treatment states that the key characteristic of var *monticola* is simply a result of plasticity in the growth form resulting from edaphic (soil and climate) conditions rather than evolutionary novelty. The variety is however, listed (by name) as sensitive in Region 4 and as such still has an analysis requirement. As a result of the lack of monitoring of this species, little is known about the threats to this species, but they are likely to be similar to those of other species that occupy rocky and barren habitats, which include competitive exclusion by invasive species. The movement of elk between feedgrounds may increase such disturbance.

Whitebark pine *(Pinus albicaulis)* – Sensitive: Whitebark pine grows in pure and mixed stands at high elevations throughout the project area. The Bridger-Teton 2007 GIS vegetation layer identified 52 acres of whitebark pine forest in the analysis area (Table 8). The areas where whitebark pine grows are largely forested. The major threats to this species, as identified by Tomback et al. (2001 and references therein) and the US Fish and Wildlife Service (USFWS 2011), are successional replacement by shade-tolerant conifers resulting from fire suppression, as well as an exotic fungal infection and native beetle epidemics none of which have any direct or indirect link to elk populations. Indirect effects include the alteration of fire management in the

vicinity of structures associated with feedground operations, where natural fire is more likely to be aggressively suppressed in the vicinity of feedgrounds.

Aspen *(Populus tremuloides)* – MIS: Aspen grows in both pure stands as well as stands which are mixed with conifers in the analysis area. The Bridger-Teton GIS vegetation layer identified 642 acres of aspen forest in the analysis area (Table 8). At the Patrol Cabin site 162 acres of pure aspen are present along with 2 acres of aspen mixed with conifers. Direct effects from a concentrated and supplemented winter elk population include browsing and the removal of aspen biomass as well as physical damage to aspen ramets and seedlings. There is also an indirect effect which operates through the suppression of natural fire in the vicinity of feedgrounds.

The direct effects of elk browsing on aspen have a large spatial variability, but there is a general pattern. In the immediate vicinity of where feeding takes place more stems are browsed than are grown anew each year (LD index[4] much less than zero) and the aspen are thus dying back. (WGFD 2011) At a distance of 250 – 500 meters (~ 800-1,600 feet) the LD index approximates zero, indicating that the current year's growth is browsed back to the stem and no net growth occurs. Between 500 - 750 meters and beyond the LD index exceeds zero and each year's growth exceeds that which is browsed, and as a result there is net growth. (id.)

The report stresses that aspen are still alive even where the LD index is well below zero. Aspen are a long-lived clonal organism and the damage to growth on each year's ramets is clearly not immediately lethal as it would be on a non-clonal organism. However, it remains to be seen how long individual aspen clones can survive in the immediate vicinity of supplemental elk feeding with negative growth of ramets each year combined with the likely fire suppression in the area surrounding facilities associated with supplemental feeding. It is highly likely that no new sexually reproduced individuals would establish in the presence of a supplemented elk population which is held at such a level as to create negative growth. This is important in that evolution does not act on ramets, only on genets. That is, evolution does not act on the portions of the aspen clone which are browsed since in the short-term it is not lethal to the whole aspen clone. Rather, evolution acts on the genet which is the entire clone or a sexually reproduced seedling / sapling. The genet is what must die for evolutionary selection to take place. With the lack of sexual reproduction in the vicinity of feedgrounds there is stagnation in the genetic flow in aspen.

[4] Live-Dead-Index (LD Index) is a measure of height growth that occurred after a plant was intensely browsed. It is based on two measurements, the first being the height to the base of the tallest current-year-growth. The second measurement is the height to the tip of the tallest stem having a dead, vertically oriented complete annual increment that was browsed. An LD Index of about zero indicates that browsing is preventing height growth.(Keigley and Frisina 2011)

Species with Possible Habitat Present in the Project Area with No Known Occurrences

Species That Occupy Habitat Which is Rocky or Barren

Species in this group have habitat which is rocky or barren and often found at moderate to high elevations in an alpine or sub-alpine setting. The potential habitat of these species is often found in areas which are classified as devoid of vegetation and as such have little interaction with winter elk feeding. While some of these sparsely vegetated areas could be used by elk moving between feedgrounds it is unlikely that individual plants would be physically damaged because of the rocky nature of their habitat.

Sweet-flowered rock jasmine (*Androsace chamaejasme ssp. carinata*) – Sensitive: Sweet-flowered rock jasmine grows on rocky ridgecrests, slopes, and rock meadows in sparsely vegetated areas from Alaska and Canada south to Colorado. There are 6 known occurrences in Wyoming, most of which occur in wilderness areas or Research Natural Areas. No individuals have been found on the Bridger-Teton National Forest. It is unlikely that this species' habitat would be impacted by elk traveling between feedgrounds.

Payson's milkvetch (*Astragalus paysonii*) – Sensitive: Payson's milkvetch is a disturbance adapted species which grows in sandy soils with a low cover of potentially competing vegetation (Heidel 2008). This species is largely associated with areas disturbed by fire and other natural disturbances. In the absence of natural disturbance this species occupies areas disturbed by road construction, logging and cattle grazing. It is likely that a concentrated winter elk population could create some suitable habitat for this species. This habitat creation carries with it however, the risk that invasive species could occupy the same habitat at Payson's milkvetch. There are no known occurrences in the analysis area.

Starveling milkvetch (*Astragalus jejunus* var. *jejunus*) – Sensitive: Starveling milkvetch is found in sparsely vegetated cushion plant communities. This species is restricted to extreme southeastern Idaho, northeastern Utah, and southwestern Wyoming and is classified as a Forest Service Sensitive Species by the Intermountain Region (R4) (Fertig et al. 1994). It is locally abundant and largely unthreatened in Wyoming and is not tracked as a species of concern by WYNDD. There are no known occurrences in the analysis area and the habitat of this species is unlikely to be impacted by elk feeding or elk moving between feedgrounds.

Wyoming tansymustard (*Descurainia torulosa*) – Sensitive: Wyoming tansymustard is a state endemic known from approximately 10 populations in Wyoming. The species grows in sandy soil which occurs at the base of cliffs, in cavities and on rock ledges. While some individuals grow in wilderness areas, the species is largely protected by its rocky and generally inaccessible habitat. There are no known occurrences in the project area.

Rockcress draba (*Draba globosa*) – Sensitive: Rockcress draba was previously known as *Draba densifolia* var. *apiculata*. It is a regional endemic of Idaho, Montana, Colorado, Utah and Wyoming. In Wyoming there are 22 extant occurrences, known from the Absaroka, Teton, Wind River, Beartooth, Medicine Bow, Gros Ventre, and Salt River Ranges and the Overthrust Belt (Handley 2008). None of the known occurrences are in this project area. Handley (2008) states rockcress draba is protected from human threats by its inaccessible habitat but Ladyman (2004) indicates that invasive weeds are a threat to rockcress draba.

Species Which Occupy Forested Habitat

Payson's milkvetch (*Astragalus paysonii*) – Sensitive: Payson's milkvetch is often found in environments which are recently disturbed. Many of these environments are areas which are, or were forested. The species is usually among the first to colonize after fire, road building, or another disturbance. Individual plants or their seeds must be present in the forested area before the disturbance. As such, this species is included in the forested group. Elk feeding and elk moving between feedgrounds is unlikely to interact with this species. No known individuals are present in the analysis area.

Species Which Occupy Riparian Habitat

Pink agoseris (*Agoseris lackschewitzii*) – Sensitive: Pink agoseris is a regional endemic of east central Idaho, southwestern Montana and northwestern Wyoming. In Wyoming it is known from the Beartooth, Wind River, Gros Ventre and Bighorn ranges and the Yellowstone Plateau. It is known from at least 45 extant occurrences and one historical record. Trend data are lacking, but Fertig (2000) states the populations are probably stable. Fertig (2000) considered threats to be low due to the high elevation habitat. Some populations are known to have persisted in disturbed areas. There is likely to be some interaction between individual pink agoseris, their habitat, and elk moving between feedgrounds. This interaction is likely to take the form of incidental browsing and trampling.

Greenland primrose (*Primula egalikensis*) – Sensitive: Greenland primrose occurs from Greenland and northern Canada to northeastern Asia; there are disjunct populations in central Colorado and northwest Wyoming. In Wyoming it is known from two occurrences, in the Absaroka and Wind River Ranges. Neither of the known occurrences are within this analysis area. Fertig (2000) states populations are stable, and that maintaining proper water levels may be important for the long-term management of this species. The boggy and marshy habitat of this species may interact with a supplemented and concentrated elk population. This interaction is likely to take the form of browsing and trampling.

Species Which Occupy Meadow or Sagebrush Habitat

Soft aster (*Symphyotrichum molle*) – Sensitive: Soft aster is endemic to the Bighorn Mountains and Hoback Canyon in Wyoming. It has been found in sagebrush grasslands and mountain meadows on deep, calcareous soils at the edge of aspen or pine woodlands (Fertig et al. 1994). In

the Bighorn Range, soft aster is known from 32 extant populations and one historical occurrence. There is one occurrence in Hoback Canyon, which is the only record known outside the Bighorn Range (Fertig 2000) and questions exists as to whether or not the Hoback Canyon occurrence was mis-identified. There are no known occurrences in the project area. It is unlikely that unknown occurrences of soft aster are in the project area however, the sagebrush areas cannot be ruled out as habitat. Fertig (2000) stated that while data are lacking for most populations, trend is probably stable and that the species appears to tolerate low levels of disturbance. The habitat of soft aster is where the majority of elk feeding operations take place and this sagebrush habitat is where elk move between feedgrounds.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action Alternative)

Direct and Indirect Effects

If winter elk management is discontinued at Alkali Creek Feedground, vegetation would increase in diversity and shrub densities. Observations on previously fed upon areas suggest that vegetation would revert to a more natural, pre-feeding condition after 20-30 years (Dean and Hornberger 2006). This effect would be tempered in the No Action alternative by continued effects of cattle grazing.

As described in Chapter 2 of the EIS to which this is a supplement, the No Action alternative ceases permitting for the WGFC to feed elk at the Alkali Creek feedground located on land administered by the Bridger-Teton National Forest. This alternative however, does not cease supplemental feeding of the winter elk population in the Gros Ventre area. WGFD has indicated that they would simply move the current feeding operation from Alkali Creek feedground to land owned by the state of Wyoming at Patrol Cabin Feedground and continue to feed at the Fish Creek Feedground. Thus the effects to rare plants are moved spatially, but the supplemented elk population would remain at the same human-influenced high level. In addition the elk herd would likely continue to move around in the Gros Ventre area responding to wolf pressure and feeding. The elk herd may also move towards the National Elk Refuge which is downstream of the Gros Ventre area and the movement back and forth between the Elk Refuge and Gros Ventre feedgrounds accounts for the expected increase in mobility. The indicator of effects from all alternatives is the number of acres of potential or occupied rare plant habitat within the area identified by Wyoming Game and Fish where elk move within the Gros Ventre area (the analysis area). Under this alternative it is more likely that the elk herd would be present and moving in the entirety of the analysis area since feeding at Alkali Creek feedground would cease and the elk would have to move between fewer, but more distant feedgrounds.

MIS and Forest Service Sensitive Plant Species Known to Occur in the Project Area

Boreal draba – MIS: The two known populations of boreal draba that occur within the analysis area occur in wet areas on rocky slopes, this is the typical habitat for this species. The supplementation and concentration of elk would be lessened under the No Action alternative, but the elk are likely to be more mobile having fewer feedgrounds to feed at. It is likely that under

this alternative a more mobile elk herd would be more likely to interact with this species' habitat. Direct impacts could come from trampling and browsing and indirect impacts could arise from habitat alteration including the vectoring of noxious weeds.

Narrowleaf goldenweed – Sensitive: The known population of narrowleaf goldenweed in the vicinity of the analysis area occurs in a fairly broad valley upslope from the Gros Ventre River. Under the No Action alternative the Gros Ventre elk herd is more likely to move across the entire analysis area in response to wolf presence and feeding. As such, it is also more likely that the same elk herd would move into this species habitat. However, the barren and rocky habitat of this species is unlikely to have any direct or indirect impacts from the elk herd moving through. Individual plants are similarly unlikely to interact with a more mobile elk herd.

Payson's bladderpod – Sensitive: The known population that overlaps with the analysis area boundary occurs in a rocky area that is naturally free of vegetation. The rocky habitat of this species is unlikely to have any direct impacts from a supplemented and concentrated elk population. The habitat of this species is likely to be under snow when the elk are present so no direct impacts are expected. The disturbance from concentrated elk is similarly unlikely to indirectly impact this species since there is little soil or vegetation to disturb. The No Action alternative likely increases the mobility of the elk herd but not the impacts to the barren and rocky habitat type.

Creeping twinpod – Sensitive: The known occurrence of this species in the proximity of the analysis area occurs on a rocky sagebrush slope. The rocky habitat of this species is unlikely to have any direct impacts from a supplemented and concentrated elk population. The habitat of this species is likely to be under snow when the elk are present so no direct impacts are expected. The disturbance from concentrated elk is similarly unlikely to indirectly impact this species since there is little soil or vegetation to disturb. The No Action alternative likely increases the mobility of the elk herd but not the impacts to the barren and rocky habitat type.

Whitebark pine – Sensitive: There is little direct interaction between whitebark pine and a supplemented and concentrated elk population. Whitebark pines are not a preferred browse and whitebark pine seedlings are unlikely to be trampled because they would be under snow when the elk are concentrated at winter feedgrounds. One possible indirect effect from the No Action alternative is with the removal of feeding at Alkali Creek feedground there would be fewer structures present on the Bridger-Teton National Forest in the Gros Ventre area. This could change the fire management in the area, possibly allowing more naturally occurring fires to be allowed to burn. Since past and present fire suppression is a primary threat to whitebark pine, there is the possibility that fires around Alkali Creek feedground, where there is whitebark pine, would be allowed to take their natural course. This could lessen the impact of past fire suppression on whitebark pine.

Aspen – MIS: The No Action alternative would likely increase the number of acres of aspen susceptible to elk browsing, since there would be one less feedground in the Gros Ventre area and the elk herd there would likely be more mobile. Aspen are a preferred browse for elk and other wild ungulates. As such, there are potential direct effects from browsing and trampling. Similar to whitebark pine, aspen is also in decline due in part to fire suppression in the past. Removing the operation and all the buildings from Alkali Creek feedground would, like the indirect effects to whitebark pine, increase the chances that a naturally occurring wildfire would be allowed to run its course on National Forest System land at Alkali Creek feedground and in the area as a whole.

Species with Possible Habitat Present in Project Area with No Known Occurrences

Sweet-flowered rock jasmine, Starveling milkvetch, Wyoming tansymustard, and rockcress draba – Sensitive: The barren and rocky habitat of these species is unlikely to interact with a concentrated, supplemented, and more mobile elk herd in the Gros Ventre area because this habitat has high exposure, lacks cover, and has little vegetation. Under the No Action alternative the elk herd is more likely to be in this habitat but the likelihood of impacts does not increase under this alternative.

Payson's milkvetch – Sensitive: Both the forested portion and the barren and rocky habitat of this species habitat are unlikely to receive additional impacts from the No Action alternative. The dense forests in the analysis area serve as thermal and visual cover for the elk. The more mobile elk population under Alternative 1 is likely to spend more time in this cover, but the difference is likely to be minor. The barren and rocky habitat has high exposure, lacks cover, and has little vegetation. The elk herd is more likely to be in this habitat but the likelihood of impacts does not increase under this alternative. The increased likelihood of trampling by elk in the analysis area and the likelihood that fire would be less aggressively suppressed under the No Action alternative could thus create more habitat for this disturbance adapted species.

Pink agoseris and Greenland primrose – Sensitive: The riparian habitat of this species could see an increase in impacts from a more mobile and concentrated elk herd under this alternative. The impacts arise in the form of increased browsing and habitat alteration since under this alternative the elk herd is likely to be more mobile and riparian corridors are used by the elk herd to move about.

Soft aster – Sensitive: Soft aster is known to occupy sagebrush and other shrub-dominated habitat types, of which there are large portions within the analysis area. A supplemented, concentrated, and mobile elk population is likely to have both direct and indirect impacts to shrub habitat types, simply because that is the dominant habitat where the elk are fed and where they spend most of their time. Direct impacts include direct browsing and trampling while indirect effects include an increase in disturbance and thus creation of habitat for invasive plant species.

Determinations

A determination of "**no impact"** is made for whitebark pine for the No Action alternative because whitebark pine and its' habitat is unlikely to interact with elk management activities.

Aspen in the immediate proximity of feeding operations have an LD ratio well below 0, which indicates that the aspen are dying back, which is contrary to the Aspen Management Guideline which says that aspen should be sustained. Elimination of elk management activities at Alkali Creek feedground would improve aspen health and be consistent with the Aspen Management Guideline.

A determination of "**no impact**" is made for Wyoming tansymustard, rockcress draba, narrowleaf goldenweed, Payson's bladderpod and creeping twinpod for the No Action alternative. A determination of "m**ay impact individuals but is not likely to cause a trend to federal listing or loss of viability**" is made for Payson's milkvetch. These determinations are supported by the following rationale:

- Wyoming tansymustard, rockcress draba, narrowleaf goldenweed, Payson's bladderpod and creeping twinpod all occupy habitat which is unlikely to have any impacts from elk management activities. Individuals of these species are likely to be under snow when elk are present and their habitat is unlikely to be disturbed by trampling. Elimination of elk management activities would have no effect.
- Payson's milkvetch occupies a fairly broad habitat spectrum. Some of the areas which are potential habitat for Payson's milkvetch could receive some disturbance from elk management activities, thereby creating habitat for this disturbance adapted species. Eliminating elk management activities at Alkali Creek feedground would reduce the amount of disturbance, reducing potential habitat for this species. This habitat creation is a two-edged sword however, because it may also create habitat for invasive plant species. Neither the lack of creation of habitat or possible interaction with invasive species is likely to push Payson's milkvetch toward federal listing.

Boreal draba is a MIS species which was formerly listed as a Forest Service Sensitive Species but has since been delisted; it is mentioned by name as an MIS in the Forest Plan. The riparian portion of this species habitat could be improved by elimination of elk management activities at Alkali Creek feedground.

A determination of "m**ay impact individuals but is not likely to cause a trend to federal listing or loss of viability"** is made for soft aster. It is unlikely that this species is present in the analysis area or even present on the Bridger-Teton National Forest. However, the large proportion of shrub habitat type present in the analysis area and the fact that the majority of feeding activities take place in the potential habitat of this species means that individuals or their habitat may be impacted by elk management activities. Eliminating these activities at Alkali Creek feedground would improve habitat for this species.

A summary of the effects determinations for Alternative 1 is displayed in Table 9.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Direct and Indirect Effects

This alternative authorizes the current feeding program at Alkali Creek feedground. Under this alternative the elk in the Gros Ventre would behave as they do now, moving as more or less a single herd in response to wolf pressure between three feedgrounds in the Gros Ventre area. The area in which these elk move is likely to be less than the area under Alternative 1 since under this alternative the elk would move between three fairly close feedgrounds in the Gros Ventre area and would not usually move downstream to the National Elk Refuge and private lands in the Gros Ventre, which is the stated goal of the feeding program in this area. As a result the elk herd in the Gros Ventre under Alternative 2 would remain fairly spatially bounded and concentrated and would have impacts in a smaller area than the entire analysis area. The indicator of impacts is the number of acres of Forest Service Sensitive Species or MIS potential habitat that may be impacted by each alternative.

Species Known to Occur in the Project Area

Boreal draba – MIS: The two known populations of boreal draba that occur within the analysis area occur in wet areas on rocky slopes in the vicinity of the Red Rock Ranch which is below the Alkali Creek feedground. The purpose of the Alkali Creek feedground is to stop the downstream migration of elk to keep them off private agricultural land. The supplementation and concentration of elk at the three feedgrounds (including Alkali Creek) would reduce the acres of potential habitat of this species that would be exposed to elk trampling or browsing. The same follows for the individual plants present in the analysis area.

Narrowleaf goldenweed and Creeping twinpod – Sensitive: The known occurrences of these species in proximity to the analysis area lay between two feedgrounds (Patrol Cabin and Fish Creek feedgrounds). As a result the Alternative 2 would decrease the likelihood that the occurrences would be impacted since there would be three feedgrounds under this alternative instead of two. The barren and rocky habitat of these species is unlikely to interact with the elk herd under either alternative. Continuing to feed at the Alkali Creek feedground would decrease the acres of potential habitat in which elk may travel through and occupy since the goal of the Alkali Creek feedground is to stop the downstream movement of elk in the winter.

Payson's bladderpod – Sensitive: The known occurrence of this species that intersects with the analysis area boundary is in the proximity of lower Slide Lake and is well downstream of the Alkali Creek feedground. The goal of the this feedground is to keep elk from occupying this area and as such this alternative reduced the likelihood that this occurrence would be impacted, it similarly reduces the number of acres of potential habitat that may by impacted. That being said, the barren and rocky habitat of this species is unlikely to interact with a concentrated and supplemented elk herd, so the difference is not substantial.

Whitebark pine – Sensitive: Whitebark pine and its habitat does not meaningfully interact with elk. The concentration of elk between three feedgrounds and the cessation of downstream migration decreases the number of acres of whitebark pine habitat that would see elk traffic. But since this traffic has little interaction with whitebark pine this difference is not substantial. An indirect impact to whitebark pine arises from the increased likelihood that wildfire would be aggressively suppressed in the vicinity of the Alkali Creek feedground. Fire suppression and its knock-on effects, alteration of successional trajectories and insect outbreaks, are identified as one of the primary threats to this species.

Aspen – MIS: Aspen are a preferred browse for elk and other wild ungulates. As such, there are potential direct effects from browsing and physical damage to individual ramets. Similar to whitebark pine, aspen is also in decline due in part to fire suppression in the past. Like the indirect effects to whitebark pine, the presence of feedground buildings and operations increase the chances that naturally occurring wildfires would not be allowed to run their natural course. The concentration of elk between the three feedgrounds and the cessation or lessening of downstream migration would reduce the number of acres of aspen that are subject to elk browse.

Species with Possible Habitat Present in Project Area with No Known Occurrences

Sweet-flowered rock jasmine, Starveling milkvetch, Wyoming tansymustard, and rockcress draba – Sensitive: The barren and rocky habitat of these species is unlikely to interact with a concentrated, supplemented, and more mobile elk herd in the Gros Ventre area because this habitat has high exposure, lacks cover, and has little vegetation. Under Alternative 2, the elk herd would move between three feedgrounds and is discouraged from moving downstream. As a result, this alternative decreases the number of acres of barren and rocky habitat that is exposed to elk traffic. But since that elk traffic does not impact this habitat the difference is not substantial.

Payson's milkvetch – Sensitive: Both the forested portion and the barren and rocky habitat of this species are unlikely to interact with a concentrated, supplemented, and more mobile elk herd in the Gros Ventre area. The dense forests in the analysis area serve as thermal and visual cover for the elk. The more spatially restricted elk population under Alternative 2 is likely to spend less time in this forested cover, but the difference is likely to be minor. The likelihood that fire would be more aggressively suppressed under Alternative 2 could create less habitat for this disturbance adapted species. The barren and rocky habitat has high exposure, lacks cover, and has little vegetation. Under Alternative 2, the elk herd would move between three feedgrounds and is discouraged from moving downstream. As a result, this alternative decreases the number of acres of barren and rocky habitat that is exposed to elk traffic. But since that elk traffic does not impact this habitat the difference is not substantial.

Pink agoseris and Greenland primrose – Sensitive: The riparian habitat of these species could see a decrease in impacts under Alternative 2. This alternative would keep the elk herd in the

vicinity of the three feedgrounds and would keep the elk from moving downstream, thus reducing the number of riparian acres potentially affected.

Soft aster – Sensitive: Soft aster is known to occupy sagebrush and other shrub-dominated habitat types, of which there are large portions between the three feedgrounds. A supplemented and concentrated elk population is likely to have both direct and indirect impacts to shrub habitat types, simply because that is the dominant habitat where the elk are fed. Direct impacts include direct browsing and trampling while indirect effects include an increase in disturbance and thus creation of habitat for invasive plant species. The lessening of downstream travel of the elk herd under this alternative would reduce the total number of acres of shrublands exposed to a supplemented and concentrated elk herd.

Determinations

Most of the species addressed here grow in areas which are rocky and sparsely vegetated where impacts from a supplemented and concentrated elk population are unlikely. For these Forest Service Sensitive Species a determination of "n**o impact**" is made based on the lack of interaction between elk feeding, these species and the habitat in which they grow.

For Forest Service Sensitive Species that occur in habitats that could receive impacts from elk feeding a determination of "**may impact individuals but is not likely to cause a trend to federal listing or loss of viability**" is made based on the possibility that known individuals could be browsed or trampled or the potential habitat could be altered by elk feeding. The table below shows the summary of effects for the plant species. Further details are found in the *Botany Specialist Report* in the project record.

Table 9: Summary of Effects

Species	MIS Type	Alternative 1 No Action		Alternative 2 Alkali Feeding	
		Determination [1]	Likelihood[2]	Determination	Likelihood
Agoseris lackschewitzii pink agoseris	Sensitive	MII[3]	Moderate	MII	Moderate
Androsace chamaejasme ssp. carinata sweet-flowered rock jasmine	Sensitive	NI	Low	NI	Low
Astragalus jejunus var. jejunus starveling milkvetch	Sensitive	NI	Low	NI	Low
Astragalus paysonii Payson's milkvetch	Sensitive	MII	Moderate	MII	Moderate

	MIS Type	Alternative 1 No Action		Alternative 2 Alkali Feeding	
Descurainia torulosa Wyoming tansymustard	Sensitive	NI	Low	NI	Low
Draba globosa rockcress draba	Sensitive	NI	Low	NI	Low
Ericameria discoidea var. linearis narrowleaf goldenweed	Sensitive	NI	Low	NI	Low
Lesquerella paysonii Payson's bladderpod	Sensitive	NI	Low	NI	Low
Physaria integrifolia var. monticola creeping twinpod	Sensitive	NI	Low	NI	Low
Pinus albicaulis whitebark pine	Sensitive	NI	Low	NI	Low
Primula egalikensis Greenland primrose	Sensitive	MII	Moderate	MII	Moderate
Symphyotrichum molle soft aster	Sensitive	MII	Moderate	MII	Moderate
Not Region 4 Sensitive – MIS Only					
Populus tremuloides aspen	Ecological MIS	Portions of the analysis area would be in contradiction of the AMG[4]	High	Portions of the analysis area would be in contradiction of the AMG[4]	High

[1] Determinations are made for Forest Service Sensitive Species only, for MIS a summary of effects is given
[2] Likelihood is based on species distribution and potential for effects from alternatives with design features in place
[3] May impact individuals but is not likely to cause a trend to federal listing or loss of viability
[4] Aspen Management Guideline

Cumulative Effects

The potential for cumulative effects related to vegetation resources for the Alkali Creek Feedground project was considered within the corridor analysis area.

General impacts of winter elk management on vegetation communities are the conversion of sagebrush upland, aspen, and willow/cottonwood riparian ecotypes to those dominated by herbaceous species, primarily grasses, with reduced species richness and diversity. Past, present, and reasonably foreseeable management actions that could convert sagebrush uplands and willow/cottonwood riparian ecotypes in the analysis area include livestock grazing, sagebrush

herbicide treatment, and prescribed fire. Wildfire is not a management action; however its effect is similar to prescribed fire. Off-road vehicle use and cross-country foot travel related to antler hunting in May and June is another action that affects vegetation resources within the area within and adjacent to the feedground. The table below displays data about wildfire and the management actions by alternative.

Table 10: Information Related to Vegetation Considered in the Cumulative Effects Analysis

Acres of National Forest System Lands within the Project Area	0 Acres Alt 1 91 Acres Alt 2
Acres of National Forest System Lands within the analysis area	3,062 Acres
Acres of active grazing allotments within the analysis area	1,179 Acres
Acres of wildfire within the analysis area within the past 30 years	606 Acres
Acres of prescribed fire within the analysis area within the past 30 years	83 Acres
Acres by vegetation type within the analysis area	93 acres aspen 2 acres aspen/conifer mix 492 acres barren, rocky, and sparsely vegetated 4 acres cottonwood 316 acres grassland/forbland 1,394 acres mixed sagebrush 5 acres mountain shrubland 0 acres riparian herbland 49 acres whitebark pine 79 acres willow

The cumulative effect of livestock grazing in combination with continued heavy browsing by elk in the winters could prevent suppressed willow plants in wet meadow habitat from recovering to a healthy condition within and adjacent to the feedground. While no acres of mapped riparian vegetation occurs within the project area, approximately 79 acres of willow and four acres of cottonwood vegetation types are located within the analysis area (approximately one mile radius) of the feedground. Past livestock grazing and elk feedground use has also cumulatively affected the suppression of sagebrush and other mountain shrubland growth within the project area and a small portion of the analysis area immediately adjacent to the project area.

The impacts to sagebrush created by wildfire and prescribed fire are temporary. Natural succession would result in treated or burned areas becoming vegetated with grass and forbs, then transitioning to sagebrush upland or willow/cottonwood riparian ecotypes over time. No

cumulative effects are expected from the combination of winter elk management activities and past, present or future prescribed fire or wildfire events.

Pink agoseris, Payson's milkvetch, Greenland primrose and soft aster are the only Forest Service Sensitive Species with potential effects from the proposed action, boreal draba and aspen are MIS which have potential effects. This potential habitat includes forested areas, riparian areas, shrublands and aspen forests. Within this analysis area past, present and reasonably foreseeable future activities that have the potential to impact Forest Service Sensitive or MIS plants include cattle grazing, invasive plant control, timber harvest and fuels reduction projects, wildfire suppression, previous wildfire, insect and disease management, and road maintenance.

There are policies and mitigation measures in place that reduce or eliminate impacts to Forest Service Sensitive Species from these management activities. Because of these policies, the cumulative effects expected from the alternatives proposed for this project, when combined with the effects from the other management activities, are not expected to contribute to any change in status or viability of sensitive plants. Nor are the cumulative effects expected to contribute to an increase in any current or predicted downward trend in population numbers or habitat capability that would reduce the existing distribution of any of the other R4 Sensitive plant species discussed in this analysis, under either of the alternatives. This conclusion was reached by using the indicators for direct and indirect effects from the proposed activities and adding them to the following expected effects from other management activities:

- Cattle grazing in the general area may interact with a supplemented elk population; direct effects from grazing include the loss of above and below ground biomass through grazing and trampling. Indirect effects include the alteration, deterioration or creation of potential sensitive or MIS plant habitat through disturbance.
- Road maintenance can create or alter potential habitat for sensitive or MIS species. Road maintenance can remove or kill individual sensitive or MIS plants.
- Herbicide, grazing or bio-control efforts to control invasive plants can have direct and indirect effects to sensitive and MIS plants. Herbicide application can be misapplied, bio-control agents can move to non-target species and grazing animals can damage non-target species. Removal or control of invasive plants can also alter the habitat away from or towards the potential habitat of a sensitive or MIS species.
- Natural and prescribed fire can directly affect sensitive species by burning individual plants. The same fires can indirectly affect sensitive plants by changing the habitat type (which is sometimes the goal of the project). In addition, fire suppression has led to increased fuel loading, canopy closure, and higher intensity wildfire. Fire is a natural disturbance in the ecosystem. In some areas, habitat succession and fire could possibly create or improve habitat for select plant species by opening up meadows or reducing the litter accumulation and competition from other plants. In other areas, wildfires or controlled fires would create high ground temperatures that could sterilize the soil and eliminate fungal species that are necessary for the survival of others. Fire also tends to favor post-fire germination of non-native species in environments where non-natives are abundant and/or native species are stressed.

- The prevalence of insect and disease outbreaks in the area has altered the forest character which has indirect effects to the potential habitat of some sensitive species. The loss of canopy species changes the biotic and abiotic character of the habitat by increasing the amount and duration of sunlight and increasing the amount of fine and course woody debris.

The actions and effects described above can be both additive and interactive to each other and to the direct and indirect effects described for all alternatives. As stated earlier, because current management and mitigation is designed to eliminate or reduce negative cumulative impacts by protecting sensitive and MIS plants from direct and indirect impacts, the cumulative effects to all species discussed in this analysis, under all alternatives, are expected to be minimal.

Hydrology Resources

Information provided in this draft supplemental environmental impact statement about the plant resources of the project area is excerpted from the *Alkali Creek Feedground Hydrology Resources Report* by Forest Hydrologist Ronna Simon.

The hydrology analysis area for this project consists of the feedground and nearby (generally within 200 feet) water bodies, riparian areas, and wetlands that may be affected by actions associated with the alternatives. Other activities within approximately one mile of the feedground are also considered if they may cumulatively impact streams, wetlands, and riparian areas; Alkali Creek, lower Lightning Creek, and the Gros Ventre River fall within this distance. Short-term effects would be those occurring from one to approximately three years, while long-term effects would be three to twenty years in duration.

Field visits were made to the feedground during fall 2007 and summer 2011. Observations of riparian and stream channel conditions, along with photographs of conditions, are found in the *Hydrology Resources Report* in the project record.

Issues to be Addressed

Issue #2: Use of the Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in [sagebrush, aspen and] willow stands associated with riparian/wetlands. [These vegetation impacts could affect wilderness qualities in the Gros Ventre Wilderness, outstandingly remarkable values (ORVs) in the Gros Ventre Wild and Scenic River Corridor, and/or pronghorn migration.] Vegetation impacts in brackets are analyzed under Vegetation Resources, Wilderness and Wild and Scenic Rivers, and Wildlife Resources sections. Alternatives under Hydrology Resources are compared in this analysis by a description of the condition of willows in the Alkali Creek feedground and in the analysis area.

Issue #3: Use of the Alkali Creek feedground concentrates the elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via excess sediment delivery and increased water temperatures. Alternatives are compared in this analysis by considering the existing condition of streambanks and wetlands within the feedground and

analysis area, then comparing the extent of streambanks and wetlands potentially affected by the alternatives.

AFFECTED ENVIRONMENT

There are no defined perennial stream channels within the Alkali Creek feedground and no intermittent channels were seen during the field visits. Water is provided via a spring-fed diversion to a stock tank. The Forest Service obtained a water right (permit) to the existing development in the name of the United States in 2011 (water right number P197140.0W). This water is used for WGFD horses that are used to spread hay. No base floodplains are affected by this feedground. Two areas totaling approximately 2.9 acres were mapped as potential wetlands in the National Wetlands Inventory (NWI) (Figure 1).

Wetlands and Riparian Areas

At the Alkali Creek feedground there are willows associated with the southern wetland and the channel that flows between the two wetlands. Willows are also associated with the spring that feeds the stock tank and the area west of the hay barns. There is no sign of elk (or other animals) browsing or otherwise impacting the willows to any notable extent.

Two areas totaling approximately 2.9 acres were mapped as potential wetlands in the National Wetlands Inventory (NWI) (Figure 11; The Wilderness boundary shown on this map, pink line with black line, is incorrect.). The first mapped potential wetland is immediately north of the hay sheds. It is a grassed swale that may be a seasonal wetland; it was dry at the time of the initial field visit (9/12/07). Willow, sedges, and grasses are present here, and it was in good condition; vegetation was robust and there was no excessive erosion taking place. The second mapped potential wetland is to the northeast of the first one. It was a dry depression without wetland characteristics at the time of the initial visit. Hay had been scattered in this area; remnants of hay bales were present and they were attracting cattle to the site, causing the area to be heavily trampled and to have large areas of bare soil exposed. Both elk and cattle use were contributing to the site's condition. The presence of the bales also extended impacts to the site past the time when the site was covered with snow, and the impacts certainly extended beyond the feeding period and beyond the time when the ground is frozen. It also appeared that cattle were grazing the uplands around the mapped wetlands.

During a site visit in July, 2011, conditions were considerably wetter than in 2007 due to high snowpack the previous winter. There was a great deal of fresh cow manure in the feedground at the time of the visit, including concentrations around the hay barn. Large concentrations of elk pellets were also noted in several locations, especially east of the southern wetland.

Grass was lush in 2011, and moisture in the feedground reflected values seen in infrared photography of the area, as opposed to 2007 when the mapped wetlands were dry. In 2011, both the wetlands had water in them, and there was a great deal of water flowing from the upper (southern) wetland to the lower (northern) one as reflected in the following infrared image, as well as a wet area above the upper wetland. Wet areas are shown in red on the imagery (Figure 12). The Forest Service polygons total 2.9 acres: the southern one is 1.7 acres and the northern one is 1.2 acres.

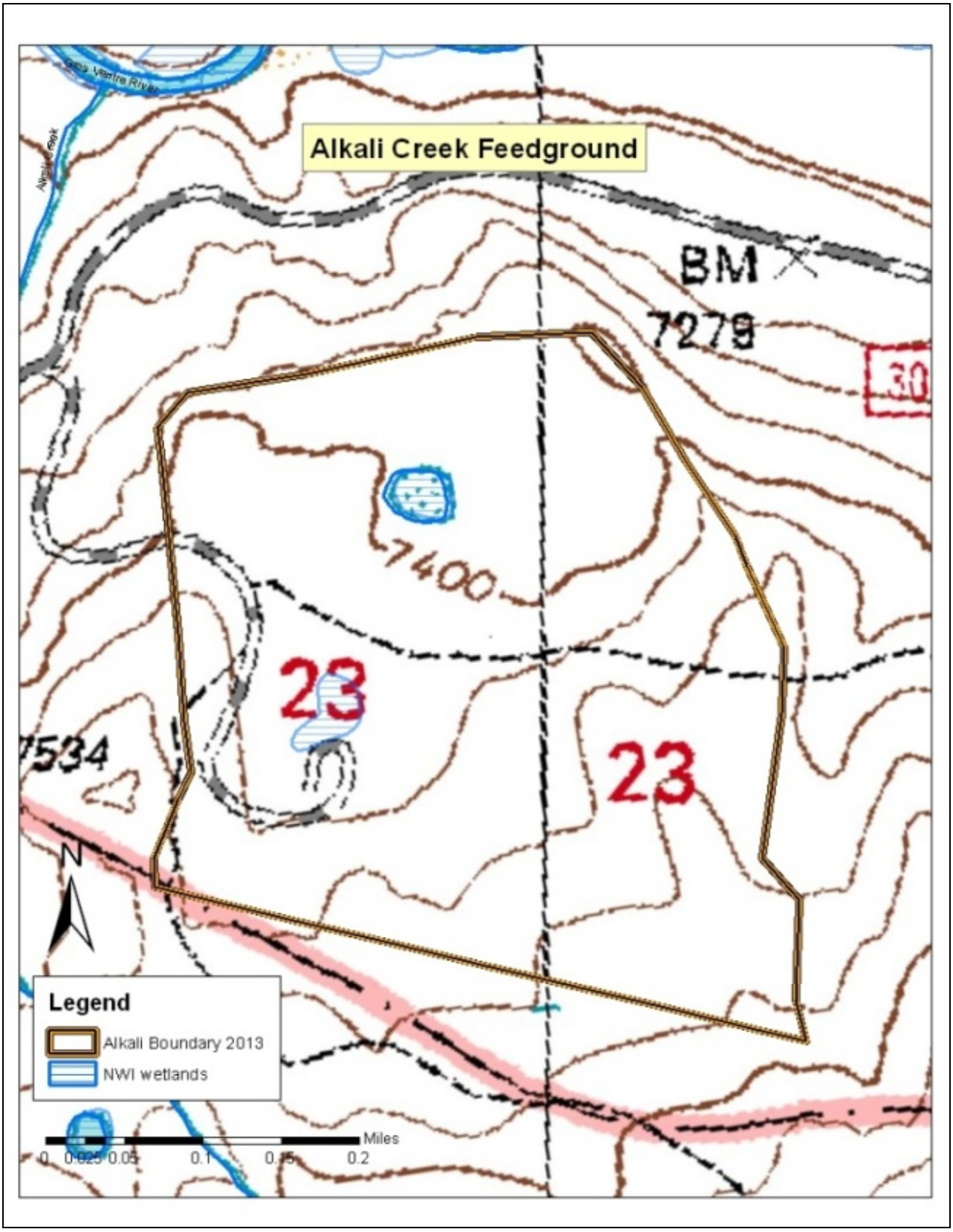

Figure 11: Alkali Creek Feedground and NWI Wetlands

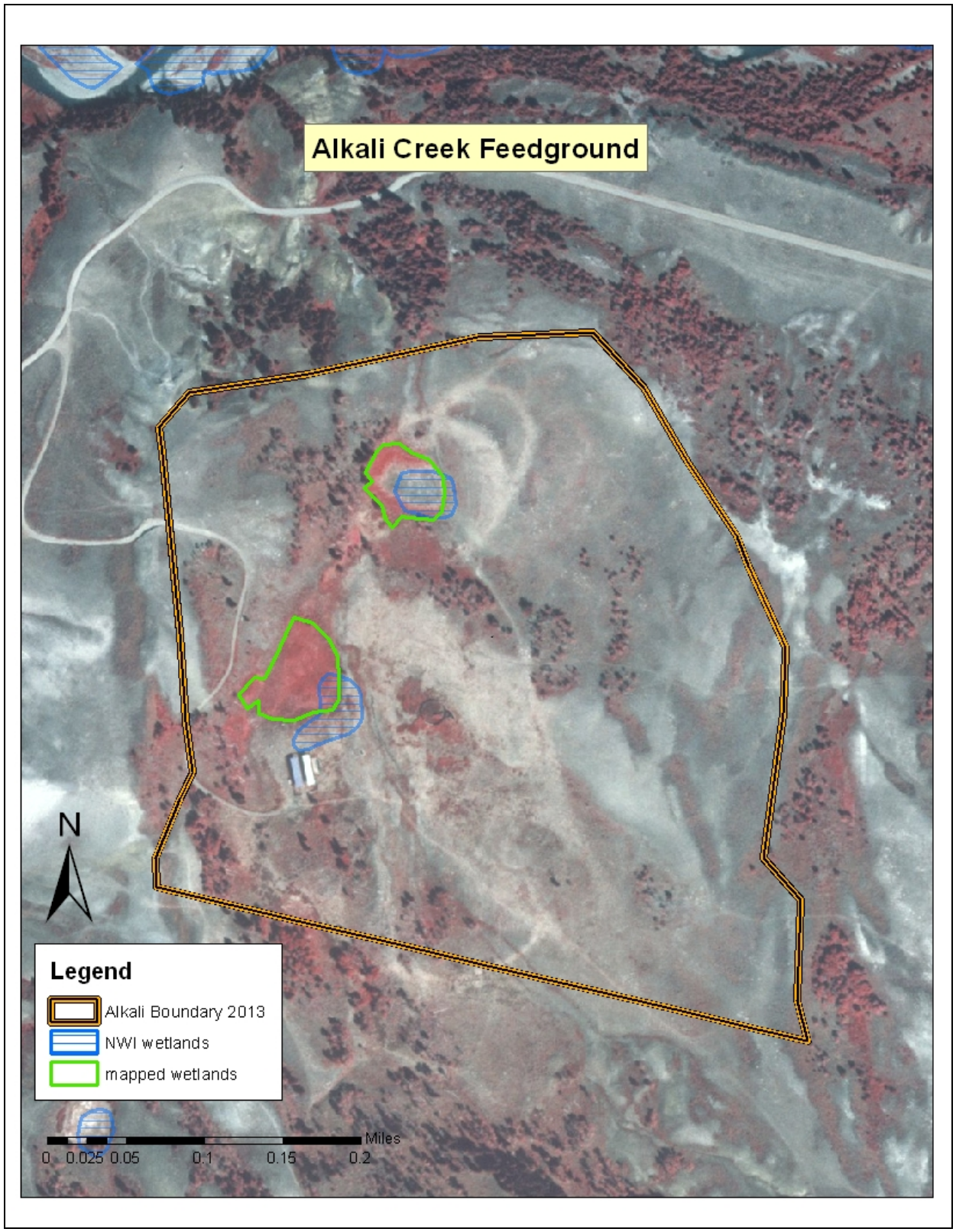

Figure 12: Delineated Wetlands and Infrared Image Showing Wetlands and Perennial Wet Area

Elk Trailing

Alkali Creek is approximately 0.2 miles west of the western boundary of the feedground. Hill-slopes above the creek are heavily trailed by elk that are attracted to the feed and travel cross-country (and across the creek) straight east to the feedground (Figure 12). Streambank alteration, reduced channel function, and increased sediment delivery to the Alkali Creek channel from trails and trampled banks are potential impacts from this trailing. There may be elk-use on willows in Alkali Creek, but the extent is not known.

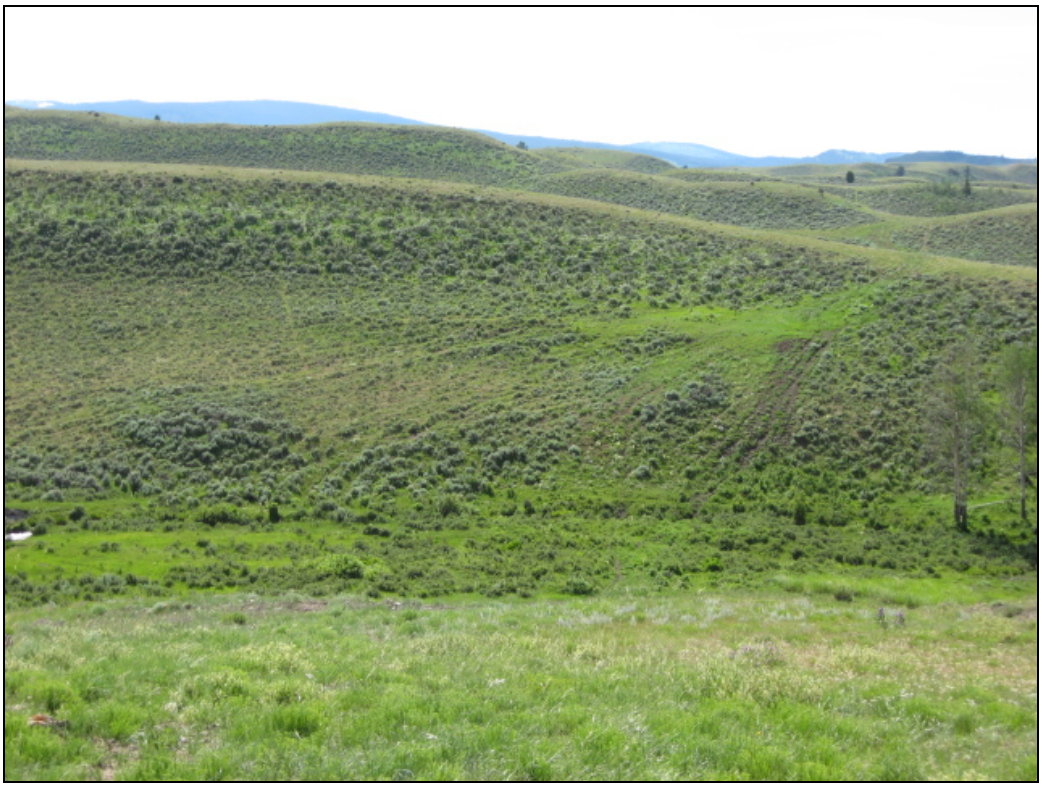

Figure 13: Elk Trailing on East-facing Slopes of Alkali Creek

The Gros Ventre River is also within the analysis area, located approximately 0.25 miles north of the feedground. It does not appear that elk are trailing directly from the river to the feedground, and there were no apparent impacts related to elk between the feedground and the Gros Ventre River. This would extend to the condition of willows along the river as well.

Wild Fires

The 2011 Red Rock fire burned south of the Gros Ventre River and the Grey Hills fire burned north of the Gros Ventre River the same year within the analysis area. In the Alkali Creek drainage within the analysis area, approximately 390 acres of the Red Rock fire burned within the analysis area at variable burn severities that were mapped as mostly moderate to high on Burned Area Reflectance Classification (BARC) vegetation maps created immediately after the fire. At its closest, the Red Rock fire came within ¼ mile of the feedground, as seen in the following figure. BARC mapping is not available for the Grey Hills fire, which came within 0.6

miles of the feedground and burned approximately 100 acres within the analysis area. The Red Rock fire was determined to potentially alter runoff patterns and, therefore, sediment delivery to Alkali Creek (and downstream to the Gros Ventre River) via the fire's BAER analysis (Simon 2011). This could add to the effects of elk migrating across Alkali Creek for up to five years, based on vegetative recovery time according to the BAER analysis. There was no BAER analysis for the Grey Hills fire.

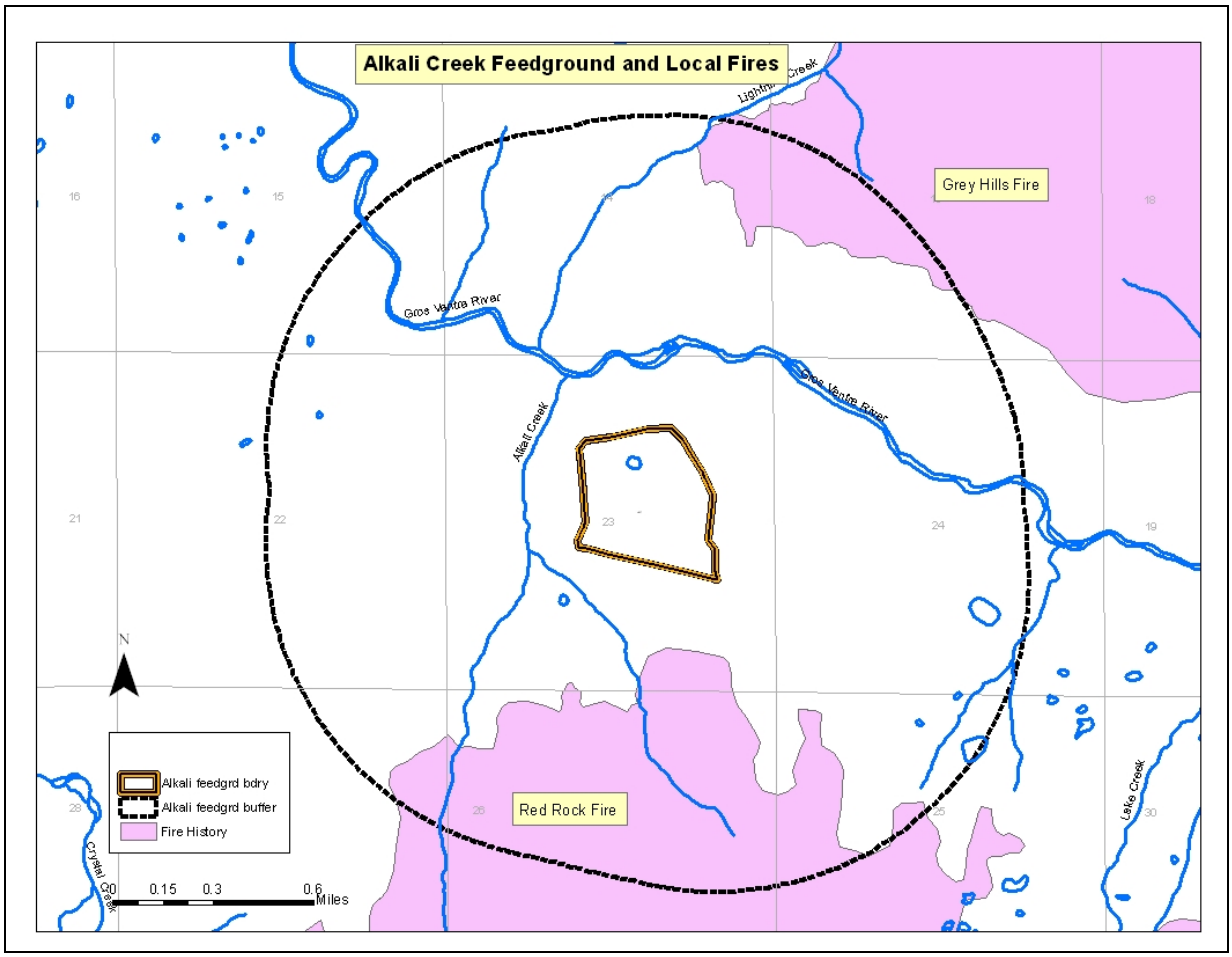

Figure 14: Fires within the Alkali Creek Feedground Analysis Area

Water Quality

There are no 303(d) listed streams associated with the Alkali Creek feedground. These are streams where the Wyoming Department of Environmental Quality has determined that water quality is either impaired or threatened. The list is updated every two years as required by Section 303(d) of the federal *Clean Water Act*. In addition, Alkali Creek feedground is not associated with a municipal watershed.

As cited in a literature review by Carlson (2010), Goodrich et al. (1973) found that elk droppings were a source of E. coli to streams, and that various bacteria were capable of surviving in their droppings for at least one year under natural conditions. Niemi and Niemi (1991) found that the concentration of bacteria was higher in running water than in ponds (where there were high

concentrations of bacteria that could likely be attributed to elk and deer). It is unclear if elk feces are a source of nitrates, as reported in data from the National Elk Refuge (USFWS, 2007).

Floodplains

Base (or 100-year) floodplains are mapped by the Federal Emergency Management Agency, and information is available on Flood Insurance Rate Maps which cover feedgrounds in Teton County. The Alkali Creek feedground is outside the base floodplain of the Gros Ventre River.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action Alternative)

Direct and Indirect Effects

If use of the Alkali Creek feedground was no longer authorized, an improvement in riparian vegetation would occur on a 1.2 acre portion of the site that is currently trampled during times when wetlands have bare soil exposed, as was the case in 2007. There would be no notable change in willow conditions in the feedground because willows are not currently being impacted to a noticeable degree. New elk pellet concentrations would not accumulate on-site, reducing the potential for nutrient and bacteria enrichment in the 2.9 acres of feeding area wetlands. Improvements would occur over a period of one to five years, with vegetation improvement occurring within approximately three to five years, depending on precipitation and other environmental factors.

Elk that had been using Alkali Creek feedground would shift their use elsewhere, where feed was available. They would go to other feedgrounds upstream (Patrol Cabin or Fish Creek) or downstream (National Elk Refuge), or to other areas of winter range outside the analysis area. Additional direct and indirect impacts to hydrologic and riparian resources would not be measurable.

This alternative would reduce concentrated elk trailing that is currently occurring along Alkali Creek, west of the feedground, because elk would no longer be attracted to the site. Stream channel conditions and elevated sediment levels would improve over a period of five to twenty years. If willows are being impacted along Alkali Creek, their condition would improve within three to five years under this alternative. Conditions along the Gros Ventre River would remain unchanged. The existing water right would be retained in the name of the United States.

Indirect impacts by cattle as seen in the feedground via the copious amounts of cattle feces and apparent grazing in the vicinity of remnant hay bales and around the hay barns would be reduced by implementation of the No Action alternative. Riparian vegetation around the wetlands would improve in condition, especially in dry years, and there would be less potential for water quality degradation from livestock fecal matter in the vicinity of the wetlands (and in other areas of the feedground) due to direct fecal input and due to overland runoff of bacteria and nutrients. Impacts from fenced livestock in wetlands would depend on enforcement actions.

Under this alternative, WGFC would rehabilitate impacts at the Alkali Creek feedground site. The hay barns and other related facilities would be removed; however the Forest Service would probably retain the spring development and use it for wildlife benefit, adding this beneficial use

to the current water right (T. Robertson, pers. comm.). This would not have a direct impact on water resources but would have an indirect effect via changes in local hydrology when the area around the barns is rehabilitated. Infiltration at the site would increase and local water tables may rise slightly, although the change is not expected to be noticeable.

Cumulative Effects

Management actions that could contribute cumulative effects related to hydrology resources were considered within the analysis area, the area within approximately one mile of the feedground. Past, present, and reasonably foreseeable management actions that could trample riparian vegetation, damage streambanks, affect channel function, and affect water quality were considered. Table 10 displays data about the management actions and resources considered for watershed cumulative effects by alternative.

The feedground is in the Upper Gros Ventre cattle allotment. Cumulative impacts by cattle as seen in the feedground via the copious amounts of cattle feces and apparent grazing in the vicinity of remnant hay bales and around the hay barns would be reduced by implementation of the No Action alternative. There would be less hay to attract cattle, so there would be fewer impacts under this alternative. Riparian vegetation around the wetlands would improve in condition, especially in dry years, and there would be less potential for water quality degradation from livestock fecal matter in the vicinity of the wetlands (and in other areas of the feedground) due to direct fecal input and due to overland runoff of bacteria and nutrients. Impacts from fenced livestock in wetlands as seen in 2011 would depend on enforcement actions by the Forest. The northeastern portion of the analysis area falls in the Winter Range Forage Reserve allotment, which is rarely used for domestic livestock grazing. Cumulative impacts from this use are minor. Livestock trailing generally occurs along the Gros Ventre road; impacts to hydrologic, wetland, and riparian resources are concentrated along the road.

No prescribed burns or other vegetation management activities have taken place, or are foreseen, within the analysis area.

There are 4.7 miles of system roads in the analysis area, most of the mileage from the Gros Ventre road (FDR 30400). The closest the road comes to the Gros Ventre River is approximately 370 feet. Ketcheson and Megahan (1996) developed curves displaying the probability of exceeding certain sediment travel distances from road cross drains and fills (Figure 4 in their article). In developing their curves, they incorporated the earlier findings from Burroughs and King (1989), which were based on research in northern Idaho. From these curves, there is approximately a 4 percent probability of sediment being transported further than 100 meters (328 feet) from cross drains according to Burroughs and King (1989) and approximately a 17 percent probability of sediment being transported at least this far according to Ketcheson and Megahan (1996). So there is little chance of sediment being transported from the Gros Ventre road to the Gros Ventre River from the segment that is within the analysis area. The road crosses Alkali Creek, however, and the crossing structure is undersized, based on surveys conducted for the Red Rock fire (Simon 2011). It was clear that the culvert capacity had been exceeded in the recent past and wingwalls had been added to the pipe in an apparent attempt to funnel streamflow into it. The outlet also was not armored. The pipe's lack of capacity has caused local channel instability and deposition above the culvert inlet. The crossing is unable to accommodate the sediment and flows delivered to it from upstream, i.e., the issue is not the cumulative effect of the road on the elk feedground, but vice versa. Under the No Action alternative there would be

reduced delivery of sediment from elk activity, so less impact on the road crossing. Road 30401, which accesses the feedground from the Gros Ventre road affects groundwater hydrology to some extent within the feedground; the source for the water development is located along its prism and wetlands begin at the toe of its fill in the feedground.

Tree mortality in the analysis area would not have measurable impacts on hydrologic resources, especially when taken in the context of seasonal and annual variability seen in wetland water tables.

Table 10: Information Related to Watershed Resources in Cumulative Effects Analysis

Acres of National Forest System Lands within the Project Area	**0 Acres Alt 1** **91 Acres Alt 2**
Acres of National Forest System lands within the analysis area	3,062 acres
Acres by vegetation type within the analysis area	4 acres cottonwood 316 acres grassland/forbland 0 acres riparian herbland 79 acres willow
Distance of stream channel potentially affected in the analysis area	5.7 miles
Acres of active grazing allotments within the analysis area	1,179 acres
Miles of roads within the analysis area	4.7 miles
Miles of trail within the analysis area	1.3 miles

This alternative would comply with all pertinent laws, regulations, policies, and plans described in the *Hydrology Resources Specialist Report*. It would protect water quality, wetlands, and riparian vegetative communities.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Direct and Indirect Effects

A mitigation measure restricting feeding to at least 100 feet from the outer edge of the wetlands and the channel that connects them has been instituted by the Jackson Ranger District. This was enacted in 2012 to reduce the high concentrations of elk pellets and cattle feces in and adjacent to the wetlands that are potentially degrading water quality on 2.9 acres of wetland. This was also enacted to reduce adverse impacts to wetland and riparian vegetation, especially to the 1.2 acres of wetland that were impacted in 2007. No notable impacts to willows within the feedground are currently occurring and this condition would continue under this alternative.

The mitigation measure under this alternative would reduce adverse impacts below those levels described in the Affected Environment section. Impacts to water resources would be greater than under Alternative 1; although the mitigation measure would reduce direct impacts to wetlands and other water resources in the feedground, indirect impacts due to elk congregation and trailing through the area would continue.

Residual hay would continue to attract elk to the feedground after snowmelt, allowing for continued use of the feedground and prolonged impact to water resources during and after snowmelt and ground thaw. Elk would continue to trail across Alkali Creek to reach the feedground, resulting in no improvement to existing conditions along Alkali Creek. Degraded channel condition, altered channel function, and elevated sediment delivery to the stream would continue. If there are impacts to willow communities, those impacts would continue. Conditions along the Gros Ventre River associated with the feedground would remain unchanged. The United States would retain the water right at the stock tank and would also maintain the development, but would not need to alter the stated beneficial use on the permit as would be the case under the No Action alternative.

Cumulative Effects

Table 10 displays data about the management actions and resources considered for watershed cumulative effects for the Proposed Action alternative.

As would be the case with elk, the mitigation measure restricting feeding to at least 100 feet from the outer edge of the wetlands and their connecting channel would reduce the amount of cumulative impact from cattle below past years' impacts. This is because hay appears to be attracting cattle to the wetlands (and the hay barns). As is also the case for elk, however, adverse impacts under this alternative would be greater than under Alternative 1 because cattle would still be attracted to the feedground due to the presence of residual hay. This would result in continued grazing and mechanical alteration of wetland areas by cattle under this alternative, especially in dry years. Impacts from fenced livestock in wetlands would depend on enforcement actions. As under Alternative 1, cumulative impacts on the Winter Range Forage Reserve allotment from livestock use would be minor.

Cumulative impacts associated with the Gros Ventre road would be the same as under Alternative 1, except at the Alkali Creek crossing. At the crossing, sediment contributions from elk activity would be greater than under Alternative 1, so the adverse impact of the feedground on the road crossing would be greater than under Alternative 1. Assuming that Road 30401 would remain open, impacts would be the same under both alternatives.

Impacts from livestock trailing, prescribed burns, and tree mortality would be the same under both alternatives.

Fishery Resources

Information provided in this draft supplemental environmental impact statement about fisheries is excerpted from *The Fisheries Report for the Wyoming Game and Fish Commission Winter Elk Management Activity-Non-Recreation Special Use Permit Renewal* by David Fogle and Joseph Neal, November 2007 and Dave Fogle, June 2012. The full text of these reports is incorporated by reference.

Issues to be Addressed

Issue #3. Use of Alkali Creek feedground concentrates the elk, which could reduce stream bank stability and result in impacts to stream channel function. Surface water quality and fish habitat may also be affected by bank instability via sediment delivery and increased water temperatures. Alternatives are compared in this analysis by considering the existing condition of streambanks and wetlands within and adjacent to the feedground and analysis area, then comparing the extent of stream banks and wetlands potentially affected by the alternatives.

AFFECTED ENVIRONMENT

Existing condition and environmental effects for fish and amphibians are described within the project area and within the analysis area, which extends up to approximately one mile from the feedground. The approximately one-mile analysis area takes in a segment of the Gros Ventre River and Alkali Creek that fall outside the project boundary. Only those fish and amphibian species present or suspected in the analysis area will be carried further in the analysis (Table 11).

Kendall Warm Spring dace are not present and do not have habitat in the analysis area. They would not be impacted by this project and are not further discussed.

For population and habitat status for MIS across the Forest, refer to the BTNF MIS Report (2009) located in the project record.

Table 11: Fish and Amphibian Forest Service Sensitive and MIS on the Bridger-Teton National Forest

Common Name	Scientific Name	MIS Type and/or Species' Status	Species' Presence
Fish			
Cutthroat Trout*	Oncorhynchus clarki	Harvest/Ecological MIS and Forest Service Sensitive Species	Known
Rainbow Trout	Oncorhynchus mykiss	Harvest MIS	Known
Kendall Warm Springs Dace	Rhinichthys osculus thermalis	Endangered Species	Not Present

Common Name	Scientific Name	MIS Type and/or Species' Status	Species' Presence
Amphibians			
Boreal Toad	Bufo boreas	Ecological MIS and Forest Service Sensitive Species	Suspected
Boreal Chorus Frog	Pseudacris triseriata maculate	Ecological MIS	Suspected
Columbia Spotted Frog	Rana pretiosa	Forest Service Sensitive Species	Suspected

* Snake River fine-spotted cutthroat trout.

Fish

Trout

Alkali Creek feedground is in the Upper Gros Ventre River Basin in the Upper Snake River drainage of the Columbia River which contains habitat for rainbow trout and Snake River fine-spotted cutthroat trout (SRC). SRC are classified as game species and Species of Concern with the Wyoming Game and Fish Department, MIS (Ecological) for riparian habitat in the *1990 Bridger-Teton National Forest Land and Resource Management Plan*, and Forest Service Sensitive Species for the Intermountain Region.

SRC are found throughout much of their original range in the Upper Snake River drainage (Van Kirk and Benjamin 2001). The Gros Ventre River SRC population is generally stable but lacks suitable stream substrate for good trout reproduction (WGFD 2004). There are no perennial or intermittent stream channels within Alkali Creek feedground. Alkali Creek is approximately 0.1 mile from the project boundary and the Gros Ventre River approximately 0.7 mile from the Alkali Creek feedground. Streambank stability has been estimated between 85 and 100 percent stable for Alkali Creek (2003) and 90 to 100 percent stable for the Gros Ventre River between Crystal Creek and Upper Slide Lake (USFS 1999).

Trails created by animals moving into and out of the feedground indirectly affect the fishery by providing a source of sediment to enter streams during the snow-free times of the year, which would impact fish reproduction downstream from the feedground. Elk also browse on willow and cottonwood vegetation and have impacted the age composition favoring mature plants and reducing regeneration. Streambank vegetation benefits fish by providing shade that reduces water temperature. The project area does not include any perennial or intermittent stream channels; however there are 5.7 miles of perennial streams in the analysis area.

Amphibians

Boreal toad and boreal chorus frog are ecological indicator species for wetland habitat. The boreal toad and Columbia spotted frog are Wyoming Species of Special Concern and Forest Service Sensitive Species.

Boreal Toad

The boreal toad occupies montane forest habitats between 7,500 and 12,000 feet and requires breeding ponds, summer range, and winter refugia at various stages of its life history. It inhabits marshes, wet meadows, and the margins of streams, beaver ponds, and glacial ponds. Boreal toads also use terrestrial habitats that include meadow, shrubland, and timbered habitat types during summer as far as four miles distant from breeding sites.

The boreal toad occurs from Alaska to northern New Mexico extending from within the Rocky Mountains west to the Pacific Coast. In Wyoming, it is restricted to mountains and foothills and relatively moist conditions. The range of the boreal toad includes the entire Bridger-Teton National Forest. Breeding occurs in ponds, slow streams, river backwater channels and along lake edges. Eggs are deposited in the water. Adults are primarily terrestrial and are observed in a great variety of habitats, frequently at night during the summer. This formerly widespread and common species has declined dramatically in the last three decades in many portions of its extensive range in western North America. In winter, boreal toads appear to prefer ground squirrel burrows, slash piles near water and beaver dams/lodges where water keeps the air temperature above freezing.

Within the analysis area, suitable summer habitat for the boreal toad exists in riparian areas in and adjacent to the Alkali Creek feedground. While there are no perennial streams or intermittent channels within the feedground, the analysis area includes two areas mapped as wetlands by the U.S. Fish and Wildlife Service (Figure 12). Wetland vegetation at these sites has been classified as Booth willow, sedges, and grasses. The Alkali Creek analysis area has suitable feeding habitat and wetlands capable of supporting populations of boreal toads.

The boreal toad appears to be quite rare on the Bridger-Teton National Forest. Assessments in the Greater Yellowstone Ecosystem (Patla and Peterson 1999; Van Kirk et al. 2000) indicate that boreal toads have declined in both northern Wyoming and southeastern Idaho compared to historical records (Keinath and McGee 2005). In 2005, five boreal toad breeding sites on the BTNF were monitored (Patla, D., pers. comm.). Three of these sites were between the Buffalo and Jackson Ranger Districts, one site had breeding toads associated with it.

Potentially suitable summer habitat for the boreal toad exists in riparian areas in and adjacent to Alkali Creek feedground. Amphibian surveys conducted by the Forest Service from 1997-2003 in the Gros Ventre River basin have one record of two adult boreal toads at Brewster Lake (outside the project area). Additional surveys in 2009, 2010, 2011, and 2012 have not found any boreal toads in the Gros Ventre River basin. A site inspection of the feedground in 2012 found the wetlands dry and no indication of amphibian presence (Santini, USFS, pers. comm.). The Alkali Creek project area has suitable feeding habitat and wetlands capable (in wet years) of supporting populations of boreal toads but none have been documented at the site.

Boreal Chorus Frog

Boreal chorus frogs appear to be common on the Bridger-Teton National Forest. Boreal chorus frog sites are routinely identified during annual amphibian surveys on the Jackson Ranger District. Formerly known as the western chorus frog, the boreal chorus frog is the smallest (maximum size 1.5 inches) and most conspicuously vocal amphibian in the area. In the spring and early summer, male frogs call from ponds, marshes, and ephemeral pools, attracting females to the breeding sites. Eggs are deposited in water on submerged vegetation. After breeding,

adults disperse away from the breeding sites to moist habitats including riparian areas, grasslands, and forests.

The range of the boreal chorus frog includes the entire Forest. They occupy any wetland habitat from low-elevation deserts to alpine areas above timberline. They live in marshes, ponds and small lakes and have been known to utilize temporary water bodies (WGFD 2004). Potential breeding, rearing, and overwintering habitat exist within the Alkali Creek project area, especially in the identified wetland. Forest Service surveys from 1997 to 2003, and more recent surveys in 2009, 2010,2011, and 2012 recorded adults, juveniles and indications of breeding in Upper Slide Lake, Goosewing Creek, Burnt Creek, Soda Lake, and Grizzly Lake in the Gros Ventre watershed.

Columbia Spotted Frog

There are currently four recognized populations of Columbia spotted frogs: Northern, Great Basin, Wasatch, and West Desert. Columbia spotted frogs within the northern population are considered to be abundant; however, the other three populations (Great Basin, Wasatch, and West Desert) are either declining or almost extirpated (USFWS 2009a). The BTNF is at the very southern end of the main distribution of the northern population.

Columbia spotted frogs are found in areas where permanent, quiet water is present, such as marshy edges of ponds or lakes, algae-grown overflow pools of streams, or springs. Emergent and submergent vegetation and willows are considered important habitat features. Forest Service surveys have documented spotted frogs in Upper Slide Lake, Goosewing Creek, and Burnt Creek near the Alkali Creek feedground (USFS 2012). Wetlands in the Alkali Creek feedground have potential breeding and summer habitat in wet years but lack winter habitat associated with frozen ground.

ENVIRONMENTAL CONSEQUENCES

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action Alternative)

Fisheries - Direct and Indirect Effects

There are no perennial or intermittent stream channels in the Alkali Creek feedground therefore there are no direct benefits to the fishery from eliminating winter elk operations at this location. In the No Action alternative, game trails along Alkali Creek would recover and become vegetated over time. Stream bank vegetation would receive less browsing, resulting in improved fishery habitat. A total of 5.7 miles of stream channel in the analysis area would benefit from this action. The WGFD Basin Management Plan (2004) lists high gradient stream channels and variable flow to a lack of pool and suitable spawning habitat. The report identifies poor bank cover and limited riparian development as a limiting factor along with heavy silt/sediment loading associated with flow variation. Discontinuation of winter elk operations at Alkali Creek will have no measurable direct effect to fish or fish habitat when measured against impacts of other actions occurring in the project area. As vegetation recovers an indirect, long term improvement (>10 years) in trout habitat may occur by reducing sediment and increasing shade.

Fisheries - Cumulative Effects

The potential for cumulative effects related to fisheries resources was considered within the analysis area. Past, present, and reasonably foreseeable management actions that could affect fishery resources include livestock grazing, vehicular use on roads, off-road vehicle use, recreation trails, wildlife and livestock trailing, and dispersed camping. Off- road vehicle use and cross country foot travel is related to antler hunting in May and June.

Please refer to the Cumulative Effects text in the Vegetation and Hydrology Resources sections of this report for discussion of effects to riparian vegetation and stream health.

Fisheries Determination

A review of Forest Service habitat surveys and WGFD population and habitat surveys indicate that Alternative 1 would have a long term "**beneficial impact**" on Snake River cutthroat trout (Forest Service Sensitive Species and MIS) and rainbow trout (MIS). In addition, Alternative 1 will have No Impact or Neutral (no discernible positive or negative effect) on the ability to meet Forest Plan direction.

Amphibians – Direct and Indirect Effects

The Alkali Creek feedground provides a small amount of wetland habitat that is suitable as summer habitat for amphibians. Forest Service hydrologic surveys in 2007 and 2011 indicate the wetlands were retaining moisture, but an amphibian survey in 2012 revealed that the same wetlands were dry.

Minimal direct effects on amphibians are anticipated from not permitting use of Alkali Creek feedground since this project occurs in the winter when toads and frogs are dormant and the ground is frozen which minimizes impacts to riparian soils and vegetation.

The impact of not permitting elk feeding on the Alkali Creek feedground would remove the short term remote possibility of disturbing hibernating amphibians (both toads and frogs) in the project area. Removing the barns and structures associated with the project may have a direct short term impact to individual amphibians during the time the removal is taking place due to trampling. Although there would be indirect short term impacts to amphibian habitat as a result of removing infrastructure, the habitat would recover in the long term (<1 year) but minor habitat changes may remain.

Amphibians - Cumulative Effects

Past, present and future actions that include livestock grazing, vehicular use on roads, off-road vehicle use, recreation trails, livestock trailing, and dispersed camping may negatively affect amphibians by trampling individuals and altering habitat. Adding these effects to the minor direct and indirect effects of Alternative 1 would result in a potential for very minor cumulative short term negative effects due to removing structures that could possibly alter habitat and trample individuals. However there is a possibility of long term cumulative very minor positive effects due to no possibility of disturbing hibernating amphibians in the feedground area.

Amphibians Determination

Based on available information on species distributions and habitat using topography maps, GIS coverages, Wyoming Natural Diversity Database, aerial photos, field reconnaissance, previous surveys, as well as published scientific information, the following determinations were made for

boreal toad and spotted frog, both R4 Forest Service Sensitive Species, and chorus frog, a BTNF MIS:

Boreal toad habitat is present in the project area but surveys conducted in the vicinity over multiple years have not detected individuals. Because habitat is suitable (summer and winter), Alternative 1 would have a "**beneficial impact**" for boreal toads.

Spotted frogs and chorus frogs have not been confirmed in the wetlands in the Alkali Creek feedground but adults and juveniles have been found in adjacent streams making it likely the area is used for summer habitat. Because of the likelihood of their occurrence, Alternative 1 "**may impact individuals but is not likely to contribute to federal listing or loss of population viability**".

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Fisheries - Direct and Indirect Effects

There are no perennial or intermittent stream channels in the Alkali Creek feedground; therefore there are no direct effects to the fishery. Alkali Creek (1/4 mile from the feedground) is generally frozen and in low flow condition during the time winter elk management takes place. Timing (late winter) and conditions (snow cover) limit impacts to the fishery from streambank and in-stream disturbance adjacent to Alkali Creek feedground. Game trails would continue to deliver sediment to Alkali Creek and the Gros Ventre River, affecting fish production. Water quality from nutrient runoff associated with the feedgrounds has not had a detrimental effect on fisheries (WGFD 2004). Streambank vegetation would continue to be browsed, reducing shade that protects water temperature. In Alternative 2, a total of 5.7 miles of stream channels in the analysis area would remain affected.

Fisheries - Cumulative Effects

Continued use of Alkali Creek feedgrounds outlined in Alternative 2 combined with past, present, and reasonably foreseeable management actions that could affect fishery resources include livestock grazing, vehicular use on roads, off road vehicle use, recreation trails, livestock trailing, and dispersed camping. Off road vehicle use and cross country foot travel are related to antler hunting in May and June. The effects of Alternative 2 on streambank vegetation combined with the effects of past, present and future management actions would result in cumulative effects that would be slightly greater than the cumulative effects of Alternative 1.

Fisheries Determination

Alternative 2 "**may impact individuals or habitat but is not likely to trend towards federal listing or cause a loss of viability**" for Snake River cutthroat trout and rainbow trout. This determination is based on available information on species distributions and habitat using WGFD surveys, as well as published scientific information and would have neutral (no discernible positive or negative effect) on the ability to meet Forest Plan direction.

Amphibians - Direct and Indirect Effects

The Alkali Creek project area is frozen during the time supplemental feeding takes place. Timing of the activity (late winter) and conditions (snow cover) limit direct effects to amphibians (toads

and frogs) from ground disturbance at the site. Effects on amphibians that burrowed into the ground are minimal because of snow cover that prevents ground exposure. Compaction of soils in riparian areas may eliminate the ability for amphibians to burrow underground in order to prevent desiccation or freezing (Duellman and Trueb 1986; Swanson et al. 1996).

Riparian areas provide critical breeding, foraging, and over wintering habitats for boreal toads and are used as dispersal corridors for juvenile toads. Long-term direct impacts are minimal because changes in the amount of snow and temperature vary in length and duration from one winter to the next. Amphibian habitat for overland dispersal of spotted frogs are affected by changes in vegetation cover resulting from elk browsing in the project area on vegetation in the mapped wetland (Figure 12) in the analysis area. Elk management actions result in less shrubs and more grass in the project area. Grass at the site would benefit amphibians by providing food (insects) and cover from predators during summer.

Amphibians - Cumulative Effects

The effects of operating the Alkali Creek feedground with its associated buildings combined with non-winter activities including livestock grazing, vehicular use on roads, off road vehicle use, recreation trails, wildlife and livestock trailing, and dispersed camping have an adverse cumulative impact to amphibian habitat.

Amphibians Determination

The determination for boreal toads is "**may impact individuals but not likely to trend toward federal listing**".

Rational: The proposed action will continue to concentrate winter elk use in the project area that has resulted in a reduction of aspen tree regeneration at the feedground and in the analysis area (*Botany Resources Report*). Loss of shade increases ground temperature that could result in boreal toads avoiding the area (Patla 2001). Summer use of the area by livestock removes vegetative cover that provides micro habitat for boreal toad thermoregulation (Barlet 2000). Surveys conducted in adjacent drainages and the Gros Ventre River have not detected the presence of boreal toads but habitat is present and boreal toads have been detected outside the project area at Brewster Lake.

The determination for spotted frogs is **"may impact individuals but not likely to trend toward federal listing**".

Rational: The proposed action will continue to concentrate winter elk use in the project area that has resulted in a reduction of aspen tree regeneration at the feedground and in the analysis area. Loss of shade increases ground temperature that could result in spotted frogs avoiding the area (Patla 2001). Impacts from livestock grazing on the 2.9 acre wetland may also reduce potential summer habitat for amphibians. Spotted frogs are present and reproducing in adjacent drainages and upper Slide Lake reducing the risk to spotted frog populations and trend toward federal listing.

The determination for boreal **c**horus frogs is **"may impact individuals but not likely to trend toward federal listing**".

Rational: The proposed action will continue to concentrate winter elk use in the project area that has resulted in a reduction of aspen tree regeneration at the feedground and in the analysis area (*Botany Resources Report*). Loss of shade increases ground temperature that could result in

boreal toads avoiding the area (Patla 2001). Impacts from summer livestock grazing on the 2.9 acre wetland may also reduce potential habitat for chorus frogs at the feedground site. Chorus frogs are common in the project area. Surveys in adjacent drainages and upper Slide Lake have documented presence and reproduction reducing the risk to population viability across the landscape and reducing the trend toward federal listing.

Wildlife Resources

This section is ordered by a description of the status of wildlife species and their habitat in the Affected Environment and then by effects of the alternatives in Environmental Consequences. The first species considered in both sections were Management Indicators (MIS); followed in order by federally Threatened, and Endangered, Proposed; Sensitive; and Neotropical Migratory Bird species. Analysis requirements differ with respect to these classifications. For example, Management Indicators require analysis and "calls" about how the alternatives affect population or habitat conditions at the scale of the Forest or planning unit. Analysis of federally listed or proposed species is similar. Analysis of Forest Service Sensitive Species requires determinations concerning whether or not implementing the alternatives would move the species toward federal listing or reduce its population viability. On the Bridger-Teton National Forest, species may occur in more than one category and require more than one type of analysis. All appropriate analyses are provided in the respective section for each species. All require consideration of the past, present, and reasonably foreseeable federal, state, and private actions that may affect the populations or habitats of the species.

The area used to evaluate the effects of the alternatives for most wildlife species was the Gros Ventre River corridor extending from the Forest boundary near Turpin Creek, extending up river to the Fish Creek feedground. This area is identified in this document as the corridor analysis area and it encompasses 19,700 acres. Although most effects of herbivory associated with Alkali Creek feedground operations were localized within 750 meters of the site (see Vegetation section, this document), the corridor analysis area encompasses the related effects of elk that travel between feedgrounds in the Gros Ventre watershed and occasionally to the National Elk Refuge. The effect of elk herbivory at Patrol Cabin and Fish Creek feedgrounds was treated as a cumulative action in the cumulative effects sections for wildlife where appropriate.

Issue to be Addressed

Issue #4: Use of Alkali Creek feedground could impact elk, wolves, Canada lynx, grizzly bears, greater sage-grouse, several raptors, wolverine, scavengers such as ravens and magpies, and other wildlife, many that use meadows, sagebrush, aspen, and riparian habitat. Alternatives are compared in this analysis by a narrative describing the expected displacement and habitat changes by alternative.

AFFECTED ENVIRONMENT

Management Indicator Species (MIS)

MIS are those species whose population changes are believed to reflect the effects of land management activities. Four types of MIS are identified in the *1990 Bridger Teton National*

Forest Land and Resource Management Plan: Harvested Species, Ecological Indicator Species, Forest Service Sensitive Species, and federally listed Threatened and Endangered Species. Twenty-three MIS occur on the BTNF; seven mammals, four birds, three fish, two amphibians, and seven plant species. Fish and amphibian species are discussed in the Fisheries Section, while plant species are discussed in the Vegetation Resources section of this report.

Only those species present or suspected in the corridor analysis area will be carried further in the analysis (Table 12). Whooping cranes are not present and do not have habitat in the corridor analysis area. They would not be impacted by this project and are not further discussed. For additional information on the population and habitat status for MIS across the Forest, refer to the BTNF MIS Report (2009) located in the project record.

Table 12: Wildlife MIS on the Bridger-Teton National Forest

Common Name	Scientific Name	MIS type	Species Presence
Mammals			
Grizzly Bear	*Ursus arctos horribilus*	Threatened	Known
Elk	*Cervus elaphus nelsoni*	Harvest	Known
Mule deer	*Odocoileus hemionus*	Harvest	Known
Moose	*Alces alces shirasi*	Harvest	Known
Bighorn sheep	*Ovis canadensis canadensis*	Harvest/Ecological/USFS Region 4 Sensitive	Known
Pronghorn antelope	*Antilocarpa americana*	Harvest	Known
North American marten	*Martes Americana origins*	Ecological	Known
Birds			
Bald eagle*	*Haliaeetus leucocephalus*	Sensitive	Known
Peregrine falcon*	*Falco peregrinus anatum*	Sensitive	Known
Whooping crane	*Grus americana*	Endangered	Not Suspected
Brewer's sparrow	*Spizella breweri*	Ecological	Known

Bald eagle and peregrine falcon have been removed from the Threatened and Endangered Species list since the time that they were designated as MIS on the BTNF. They are now managed as Forest Service Sensitive Species. Refer to the Forest Service Region 4 Sensitive Species section for further information.

Harvest Management Indicator Species

Elk

Elk are habitat generalists. During the summer, they spend the majority of their time in alpine and subalpine habitats. During the winter, elk movements are restricted by forage availability and snow conditions. Elk migrate to lower elevations where snow depth is shallow, and typically inhabit coniferous forests interspersed with riparian areas as well as south-facing slopes with sagebrush and other shrubs and aspen forests.

The Gros Ventre watershed as a whole provides abundant habitat for elk throughout the year. The majority of the elk in the affected herd unit migrate to feedgrounds at low elevations (about 7,500 feet) in the winter, with the timing dependent upon the severity of the weather. Two feedgrounds, Fish Creek and Patrol Cabin, are located further up the Gros Ventre drainage. In the past, only an average of 497 elk was fed at the Alkali site and there was little interchange of elk among the three feedgrounds. However, since 2000, wolf activity in the area has influenced winter elk distribution in the Gros Ventre, resulting in elk aggregating into one large group of up to 3,200 animals. Elk now often congregate on one feedground and move to other feedgrounds, in response to wolf pressure.

The corridor analysis area supports 17,109 acres of crucial range identified by the Wyoming Game and Fish Department (WGFD). This range type describes areas of seasonal range, often wintering areas, or habitat components that determine a population's ability to maintain itself at a certain level (Wyoming Chapter of the Wildlife Society 2006). The corridor also encompasses 12,096 acres of parturition (birthing and nursery areas—mid May to late June) range.

The corridor analysis area is located within the Jackson elk herd unit EL102. The population trend for the Jackson Herd has been stable to slightly declining over the past 5 years (2007-20011). The five year (2007-2011) population average was 12,310 elk and the 2011 estimate totaled 11,970 (WGFD 2011c). The population objective for the Jackson elk herd unit is 11,000 $\pm$ 10 percent.

Mule Deer

Mule deer are habitat generalists. They are often associated with early-successional vegetation and use sagebrush-grasslands, mixed-mountain shrublands, quaking aspen forests, various types of conifer forests, and recent burns. In mountainous regions when winter snow pack becomes deep, mule deer migrate to lower elevations.

Mule deer habitat is widely distributed throughout the Gros Ventre watershed. The analysis area supports no crucial and no parturition range. Mule deer that spend the late spring, summer, and fall months in the Gros Ventre drainage migrate to lower elevation areas but do not winter at feedgrounds in the area. Some mule deer migrate to the Upper Green River watershed via the head of the Gros Ventre River, some to winter ranges near Dubois, Wyoming via Fish Creek (an upper Gros Ventre tributary), and some to Jackson Hole.

The corridor analysis area is located within the Sublette mule deer herd unit MD 104. The mule deer population trend for this herd has been declining and is currently below management objectives. The five year (2007-2011) population average was 27,700 deer and the 2011 estimate totaled 20,800 (WGFD 2011c). The population objective for the Sublette deer herd unit is 32,000 $\pm$10 percent.

Moose

Moose occur throughout the Gros Ventre watershed on a yearlong basis, save for alpine and rocky habitats at high-elevations. They use a variety of habitats from dense coniferous or quaking aspen forests to mixed-mountain shrublands, open meadows, and riparian areas. During the summer months, they are associated with coniferous forests where they seek relief from warm temperatures. Gros Ventre moose typically move to lower elevation and use willow-dominated riparian areas in the winter, but do not use forage provided by feedground operations. The corridor analysis area supports 3,796 acres of crucial winter range and no acres of parturition range.

Because suitable moose habitat in the corridor analysis area is sparse, few moose are documented during mid-winter helicopter surveys conducted annually by the Wyoming Game and Fish Department. The density of wintering moose is notably higher further upstream in the Gros Ventre drainage. From 1999 to 2013, only 19 total moose were documented wintering in the corridor analysis area (Brimeyer, WGFD, pers. comm.).

The corridor analysis area is located within the Jackson moose herd unit MO103. The Jackson moose population trend has been declining due to low adult survival coupled with low calf recruitment. The five year (2007-2011) population average was 1,270 moose with an estimated 2011 population of 900 (WGFD 2011c). The population objective for the Jackson moose herd unit is 3,600 $\pm$ 10 percent.

Pronghorn

Pronghorn use sagebrush-grassland habitat throughout Wyoming. They are typically associated with open areas where their vision is unrestricted.

Approximately 200 pronghorn spend the summer and fall months in the Gros Ventre drainage and in Grand Teton National Park, where they are associated with grassland and sagebrush steppe. The corridor analysis area supports no pronghorn crucial winter range or parturition range.

Pronghorn migrate west from winter habitats in the Upper Green River watershed during April and May, and return east from September to early November. Their migration route is protected as the Pronghorn Migration Corridor (*Pronghorn Migration Forest Plan Amendment*; USFS 2008). Much of the pronghorn corridor occurs in the Gros Ventre River corridor and is on the Bridger-Teton National Forest. There is little or no temporal overlap between feedground operations in the Gros Ventre watershed and pronghorn migration.

The corridor analysis area is located within the Sublette pronghorn herd unit PR 401. The population trend for this herd has been downward with a 5 year (2007-2011) population average of 59,400 and a 2011 estimate of 37,800 (WGFD 2011c). The population objective for the Sublette antelope herd unit is 48,000 $\pm$10 percent.

Bighorn Sheep

Please refer to the Forest Service Region 4 Sensitive Species section of this document.

Ecological Management Indicator Species

American Marten

This species is an ecological indicator of the condition of old growth habitats on the BTNF. Marten inhabit late-successional, old growth, and mixed-age stands of conifers, especially those with complex physical structure at ground level. They eat a variety of foods such as small mammals, rodents, berries, eggs, and fish (Ruggiero et al. 1994). The marten is broadly distributed—its range extends from the southern Sierras and northern New Mexico to northern Alaska, Canada and to Newfoundland Island. Within the lower 48 states, its distribution is limited to mountain ranges that provide habitat.

Pine marten are expected to occur throughout forested habitats surrounding the Alkali Creek feedground and along the Gros Ventre River corridor. Snow tracking surveys were conducted in the Buffalo Ranger District in the winter of 2009-2010. As shown in the table below, most marten tracks were found in spruce-fir habitat, although marten also used open habitats, such as meadows. Spruce-fir habitats comprised 39 percent of transects, but this habitat accounted for 70 percent of marten tracks.

Table 13: Marten Tracks per Habitat, Buffalo Ranger District, 2009-2010

Habitat Type:	Whitebark	Spruce-Fir	Open Meadow	Climax Lodgepole	Early-seral Lodgepole	Mid-late seral Lodgepole
# Sections Surveyed	3	45	57	3	4	5
# Marten Tracks Found	2	37	11	1	1	1
% Total Sections	2.5	39	49	4	2.5	3
% Total Marten Tracks	4	70	20	2	2	2

In winter, marten diets are dominated by voles, mice, snowshoe hares, and squirrels. They forage on the snow surface, in subnivean spaces (below snow), and up in trees. Summer foods include mammals, birds, bird eggs, carrion, fish, and soft mast such as huckleberries (Buskirk and Ruggerio 1994).

Wildfires in the Gros Ventre watershed recently burned large areas (more than 10,000 acres) at all ranges of intensity. Although fires carry many positive, long term (more than 30 years) effects on marten habitat by altering vegetation diversity and age structure, they may carry negative effects on marten and their prey by locally reducing horizontal cover and forest structure, particularly at sites burned at high intensity.

Brewer's Sparrow

This species is an ecological indicator for sagebrush habitat. It is also a sagebrush-obligate, which means it is restricted to sagebrush habitats during the breeding season and perhaps year-

round. It is a common summer resident in the corridor analysis area, but is absent during the period (late December to mid-April) of feedground operations.

About 11,450 acres of sagebrush occur in the corridor analysis area, 63 percent with 10–24 percent canopy cover and 27 with more than or equal to 25 percent cover. Nearly all of sagebrush communities north of the Gros Ventre River, including the corridor analysis area are outside of livestock (cattle) allotments and are in good ecological condition. Seven cattle allotments occur in the corridor analysis area (total 3,402 acres; range 3–2,261 acres); most occur south of the Gros Ventre River. Some sites along the lower tributaries to the Gros Ventre River are impacted by cattle foraging and trailing. These sites primarily support grass, sagebrush, and riparian communities near water. More information about sagebrush is found in the Vegetation Resources section of this document.

Brewer's sparrows are common on the Jackson and Buffalo Ranger Districts. During spring 2010 and 2011, wildlife technicians conducted point counts of Brewer's sparrows and other birds in sagebrush communities in this area. For 2010, 31 Brewer's sparrows were detected at 14 of 59 (24 percent) survey points. For 2011, 28 birds were detected at 17 of 51 (33 percent) points.

The Rocky Mountain Bird Observatory (RMBO; http://rmbo.org/v3/avian/ExploretheData.aspx) provides data for breeding bird surveys conducted in the Rocky Mountain Region. For 2010 and 2011, the number of Brewer's sparrows estimated on the BTNF was 13,180 and 16,780 individuals, respectively. Brewer's sparrows were detected on two transects on the BTNF in 2010 and 2011. On one transect, RMBO estimated the Brewer's sparrow density increased from 0.92 birds per square kilometer in 2010 to 1.16 in 2011. On the other transect, estimate density increased from 4.34 birds per square kilometer in 2010 to 5.52 in 2011.

The U.S. Geological Survey coordinates breeding bird surveys and presents trend data for North America, by individual state, and for local transect routes (data available at http://www.mbr-pwrc.usgs.gov). For the U.S. region, Brewer's sparrow counts on 630 transects from 1996 to 2010 were stable (0.4 percent decrease, but confidence intervals for percent change included zero). For Wyoming, counts on 117 transects from 1996 to 2011 were also stable (0.5 percent decrease, but confidence intervals included zero). Five survey routes occur on the BTNF, including two ("Moose, Wyoming"—Gros Ventre watershed and "Wilson, Wyoming"—Fall Creek) in proximity (less than 28 miles) to the Alkali Creek feedground. Brewer's sparrow counts at Wilson from 1982 (1 bird) to 1997 (3 birds; last available count) averaged 2.4 birds, with no discernible trend in the local population. Counts at Moose from 1976 (28 birds) to 2003 (32 birds; last count) averaged 24 birds with an increasing trend evident.

Threatened Species

This section identifies the existing condition of threatened, endangered, and proposed species within the corridor analysis area. The corridor analysis area is the Gros Ventre River corridor spanning the National Forest boundary down-river to near Turpin Creek upriver to the Fish Creek feedground. A detailed Biological Assessment for federally listed Threatened and Endangered Species is located in the project record. Federally protected species that are found on the BTNF and are known or suspected to occur within the area of influence of the corridor analysis area are shown in the table below.

Table 14: Threatened and Endangered Wildlife Species on the Bridger-Teton National Forest and their Designated Critical Habitat

Species	Federal Status	Species Presence in the Corridor analysis area
Whooping Crane (Grus Americana)	Endangered	Extirpated in Wyoming; not further considered
Canada Lynx (Lynx canadensis)	Threatened	Rare (possible) in analysis area
Designated Canada Lynx Critical habitat	Designated	Encompasses the feedground
Grizzly bear (Ursus arctoshorribilis)	Threatened	Known
North American wolverine (Gulo gulo (luscus))	Proposed for Listing	Suspected

Canada Lynx

Historical records on the Bridger-Teton National Forest indicate little occurrence or evidence of lynx residency. Based on a review of sightings records for Wyoming from 1856 to 1986, Reeve et al. (1986) concluded that lynx observations were concentrated in the Wyoming, Salt River, Absaroka, and Wind River Ranges, with most sightings associated with subalpine fir or lodgepole pine forests at elevations exceeding 6,500 feet. From 2000 to 2009, resident lynx and offspring were documented on the Big Piney, Greys River, and Kemmerer Ranger Districts in the Wyoming and Salt River Ranges in excess of 40 miles south of the Alkali Creek feedground (Squires et al. 2003).

There currently are no records of lynx, including natal dens, at or near the Alkali Creek feedground. Snow track surveys conducted on the Buffalo Ranger District by Endeavor Wildlife Research Foundation produced approximately 50 sets of lynx tracks and records of several different individuals (DNA-based identification), primarily for high (more than 8,000 feet) elevations (Berg et al. 2005, 2008, 2009; Smith et al. 2006). Based on telemetry, tracks, and DNA information, one lynx identified in the Wyoming Range and one from Yellowstone National Park traveled through and/or resided for several years on the Buffalo Ranger District, including areas within or adjacent to Blackrock Creek (Squires et al. 2003; Murphy et al. 2006; 17 miles from Alkali Creek feedground). One lynx track was found about one mile from Turpin Meadows near the Buffalo Fork River, Buffalo Ranger District (19 miles from Alkali Creek feedground). These occurrences suggest that while some areas on the Bridger-Teton National Forest can support lynx, the Gros Ventre watershed provides little habitat.

Lynx analysis units (LAUs) and lynx habitat on the Bridger-Teton National Forest were identified per guidance in the *Canada Lynx Conservation Assessment and Strategy* (Ruediger et al. 2000). The Alkali Creek feedground occurs in the 62,534 acre Upper Gros Ventre North LAU. Mapped lynx habitat in this LAU totals 54,274 acres, of which approximately 27 percent is in unsuitable condition (stand initiation stages), primarily due to the recent (2011) Red Rocks (9,670 acres) and Grey Hills (2,500 acre) fires. No recent silvicultural treatments (also often initiation stage) have recently (less than or equal to 30 years) occurred in this LAU.

Alkali Creek feedground and its immediate vicinity to the east, west, and north provide little foraging and natal denning habitat for lynx due to sparse conifer forest and open understory conditions. However, conifer and aspen stands south (upslope) of the feedground, including the analysis area, provide habitat for lynx. Levels of horizontal cover (cover boards) in the forest understory and counts of snowshoe hare fecal pellets on one square mile plots east of the Alkali Creek feedground (Upper Gros Ventre Slide and vicinity) during 2009 were moderate to high (more than 5 pellets; more than 35 percent cover) indicating that good foraging habitat was present in this portion of the LAU (Bridger-Teton National Forest files). However, pellet count data collected from 2009 to 2012 on the north side of the Gros Ventre River four miles from the feedground suggested consistently low numbers of snowshoe hares.

Revised Canada Lynx Designated Critical Habitat

In February, 2009, the U.S. Fish and Wildlife Service designated Revised Critical Habitat for the contiguous United States distinct population segment of Canada lynx (USFWS 2009). The Alkali Creek feedground occurs within the 9,500-square mile Greater Yellowstone Unit # 5. Lynx habitat mapped in accordance with *Canada lynx Conservation and Assessment Strategy* (Ruediger et al. 2000) and the *Northern Rockies Lynx Management Direction Record of Decision* (USFS 2007) is analyzed separately from lynx critical habitat, and was considered in the FEIS.

The primary constituent elements of Critical Lynx Habitat, as defined by the U.S. Fish and Wildlife Service include (1) the presence of snowshoe hares and their preferred habitat (boreal forest) conditions, (2) winter snow conditions that are generally deep and fluffy for extended periods of time; (3) sites for denning that have abundant coarse woody debris, such as downed trees and root wads; and (4) matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest and that support lynx travel. Federal actions negatively affect lynx critical habitat if they reduce the ability of the components to support lynx. These components interact to provide prey in environments that supports vital activities of persistent lynx populations: successful lynx foraging (horizontal cover and forest structure), sites for denning in and near foraging habitat, relief from competition by other predators such as coyotes, secure and connected habitat use for travel between patches of prime habitat. Predominated by grassland, sagebrush, and rocky terrain, the corridor analysis area (Gros Ventre River corridor) provides few of the primary elements of lynx habitat, namely foraging and denning habitat, and deep snow conditions. Dense, well-structured conifer stands are only extensive to the south of the feedground. These stands are not affected by concentrated elk activity due to deep snow and dense vegetation. The corridor analysis area readily provides ample matrix habitat for lynx travel, and contains no large anthropogenic barriers (e.g., roads or housing developments) to travel.

Grizzly Bear

Grizzly bears require cover for thermal, resting, and security cover. Optimum habitat consists of large areas with diverse vegetation communities, free from human disturbance. Grizzly bears are opportunistic feeders and will prey or scavenge on most available food, including ground squirrels, ungulates, carrion, and fish. In areas or times where high protein food sources are not available, grizzlies rely on the stems, leaves, roots, tubers, and bulbs of grasses and forbs, the berries of shrubs, and the cambium and pine nuts of conifers. Availability of specialized food sources such as whitebark pine stands, fish spawning streams, and ungulate winter ranges are

seasonally important. Den sites are usually far away from human activity in mountainous terrain over 6,000 feet in elevation on steep slopes when deep snow accumulates.

The corridor analysis area lies within the Greater Yellowstone Area (GYA). The GYA currently provides habitat for one of the five remaining populations of grizzly bears in the contiguous United States. Grizzly bears in this region were listed as Threatened under the ESA in 1975, were de-listed in 2007 and relisted in 2009.

Grizzly bears are increasingly documented in the Gros Ventre watershed. Alkali Creek feedground is within occupied grizzly bear habitat identified by the Interagency Grizzly Bear Study Team, based on location data extending to 2010, and within biologically suitable habitat identified by the U.S. Fish and Wildlife Service. During late April, 2012, an unidentified male grizzly bear killed a domestic cow two miles west of Alkali Creek feedground along the Gros Ventre Road, and an unidentified female with two cubs-of-the-year was captured for research purposes along the Gros Ventre River during May, 2012 (M. Boyce, pers. comm.). Grizzly bears were twice seen north of the Gros Ventre Road (C. Schneebeck, D. Brimeyer, pers. comm.) in the general vicinity of Upper Slide Lake during spring, 2011. Grizzly bears have not been seen on or very near (less than 0.5 miles) the Alkali Creek feedground during winter feedground operations. Food storage regulations are in effect from March 1st to December 1st for the northern portion of the Bridger-Teton National Forest, including the Gros Ventre watershed.

The *Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area* identifies future management efforts for the species in the Yellowstone region (Interagency Conservation Strategy Team 2007). The *2006 Grizzly Bear Amendment* (USFS 2006) to the *Bridger-Teton National Forest Land and Management Plan* (USFS 1990) implemented the Conservation Strategy. The purpose of the Strategy is to describe the coordinated efforts to manage the grizzly bear population and its habitat to ensure continued conservation in the Greater Yellowstone Area; specified the population, habitat, and nuisance bear standards to maintain a recovered grizzly bear population; documented the regulatory mechanisms and legal authorities, policies, management and monitoring programs that would be carried forward to maintain the recovered grizzly bear population; and documented the commitment of the participating agencies.

Although the Strategy is currently not in effect because the grizzly bear was relisted in 2009 (the *Grizzly Bear Recovery Plan* now applies; USFWS 1993), the Bridger-Teton uses both the Recovery Plan and the tenants of the Strategy as guidance in monitoring and managing the effects of National Forest management activities on the bear. The Strategy is best available science for grizzly bear conservation in the Greater Yellowstone Area.

The Strategy established a Primary Conservation Area for grizzly bears, with boundaries the same as the previously-established Grizzly Bear Recovery Zone. Although not in the Conservation Area, Alkali Creek feedground is in the Gros Ventre Range Bear Analysis Unit, one of seven such areas identified outside the Primary Conservation Area for the Bridger-Teton National Forest by the Yellowstone Interagency Grizzly Bear Study Team. These units are the basis for documenting and monitoring changes in road densities and secure grizzly bear habitat. The Gros Ventre Range Unit (324,905 acres) extents from the north and west boundary of Jackson Ranger District to the Hoback Divide, and east to the Pinedale Ranger District, including portions of upper Kinky Creek and other parts of the upper Green River.

A primary factor in conserving grizzly bears is the management of bear-human interactions and human disturbance in their habitat. Most grizzly bear mortality is attributable to conflicts with

humans; bears are often removed by wildlife managers because they become food-conditioned and/or habituated to human presence, or they are killed by big game hunters during close encounters. Secure habitat for grizzly bears, areas more than 500 meters from any un-barricaded road, is important because it enables bears to fully use food sources, den sites, and other components of habitat (Interagency Conservation Strategy Team 2007). Secure habitat is typically identified for the Primary Conservation Area, but it can be optionally identified, analyzed, and conserved within bear analysis units as well. Grizzly bear habitat security is achieved by limiting motorized access to (1) minimize human interaction and reduce grizzly bear mortality risks, (2) minimize displacement of bears from important habitat, (3) minimize habituation to humans, and (4) provide habitat where energetic requirements can be met with limited disturbance from humans.

North American Wolverine

In North America, wolverines occur within a wide variety of alpine, boreal, and arctic habitats, including boreal forest, tundra, and montane forests throughout much of Alaska and Canada. The southern portion of the species' range extends into the contiguous United States, including high-elevation alpine portions of Washington, Idaho, Montana, and Wyoming. Individuals have recently been detected or radio-tracked to California and Colorado. Wolverines do not appear to specialize on specific vegetation or geological habitat aspects, but instead select areas that are cold and receive enough winter precipitation to reliably maintain deep persistent snow late into the warm season (Copeland et al. 2010). This species' requirement for cold, snowy conditions means that, in the southern portion of the species' range where ambient temperatures are warmest (like Wyoming), wolverines occur principally at high (more than 8,000 feet) elevations (Inman et al. 2007; Murphy et al. 2011). Deep snow is required for successful wolverine reproduction because female wolverines dig elaborate natal dens in the snow. Such structures protect wolverine kits from predators and harsh winter and early spring weather (USFWS 2010). Wolverine habitat will likely decrease in area and become more fragmented in the future as a result of climate changes that result in increasing temperatures, earlier spring snowmelt, and loss of deep, persistent, spring snowpack (USFWS 2013). These climate change impacts are expected to reduce the number of wolverines that can be supported by available habitat and reduce the ability of wolverines to travel between patches of suitable habitat (USFWS 2013). The impact of climate warming may exacerbate the impact of other less significant threats such as recreational use of habitat, infrastructure development, and transportation corridors (USFWS 2010). During February 2013, the U.S. Fish and Wildlife Service proposed the wolverine for protection (Endangered or Threatened status) under the *Endangered Species Act*.

Wolverines are opportunistic feeders and consume a variety of foods depending on availability. They primarily scavenge carrion, but also prey on small animals and birds, and eat fruits, berries, and insects. Home ranges of wolverines are large, and vary greatly in size depending on availability of food, gender and age of the animal, and differences in habitat quality. Wolverines in the GYA had average adult male home ranges of 797 square kilometers (311 square miles) and average adult female home ranges of 329 square kilometers (128 square miles) (Inman et al. 2007).

No systematic population census exists over the entire range of wolverines in the Rocky Mountains, although populations have increased from the mid-1900s (Aubry et al. 2007; USFWS 2010). Based on current knowledge of occupied habitat and densities, wolverines in the contiguous United States number 250-300 individuals. The bulk of the current population occurs

in the northern Rocky Mountains with a few individuals in the North Cascades. Subalpine forest and alpine habitat in these areas is naturally fragmented, producing wolverine populations that are small and isolated (Aubry et al. 2007; Ruggerio et al. 2007). Wolverines naturally occur at low densities and have large spatial requirements, factors that contribute to low population viability (USFWS 2010).

A radio-marked wolverine temporarily resided north of Alkali Creek feedground (Togwotee Pass) in 2009 (Murphy et al. 2011). This individual was located on one occasion near the mouth of Horsetail Creek, approximately 6.4 miles west of the feedground. Although wolverines typically do not use ungulate winter ranges to obtain carrion during the winter ((Inman et al. 2007; Murphy et al. 2011), they likely use low elevation areas (less than 8,000 feet) in the Gros Ventre watershed for travel.

Forest Service Region 4 Sensitive Species

This section identifies the existing condition for sensitive species within the analysis area. The *Biological Evaluation for Forest Service Sensitive Species* is incorporated into this document. The fish and wildlife species listed in the table below have been designated as Sensitive by the Intermountain Region of the Forest Service. Only those species present or suspected in the analysis area that are potentially affected by the No Action or Proposed Action alternatives will be carried further in the analysis. The wildlife species that would not be affected by this project have a "No Impact" determination and are not further discussed.

Table 15: Intermountain Region Sensitive Fish and Wildlife Species

Species	Species or Habitat Potential Affect
Bighorn Sheep (*Ovis canadensis*)	Affected
Gray wolf (*Canis lupus*)	Affected
Spotted bat (*Euderma maculatum*)	Not Affected
Fisher (*Martes pennanti*)	Not Affected
Townsend's western big-eared bat (*townsendii townsendii*)	Not Affected
Bald Eagle (*Haliaeetus leucocephalus*)	Affected
Boreal Owl (*Aegolius funereus*)	Affected
Greater sage grouse (*Centrocercus urophsianus*)	Affected
Trumpeter swan (*Cygnus buccinator*)	Not Affected
Peregrine falcon (*Falco peregrinus anatum*)	Affected
Common loon (*Gavia immer*)	Not Affected
Harlequin duck (*Histrionicus histrionicus*)	Not Affected
Flammulated owl (*Otus flammeolus*)	Not Affected
Three-toed woodpecker (*Picoides tridactylus*)	Not Affected
Great gray owl (*Strix nebulosa*)	Affected
Northern goshawk (*Accipiter gentilis*)	Affected
Yellow-billed cuckoo (*Coccyzus americanus*)	Not Affected

Bighorn Sheep

Bighorn sheep are found in a variety of habitats from alpine mountain meadows to desert grasslands. In western Wyoming, sheep typically prefer high elevation alpine habitats with steep escape terrain adjacent to open foraging areas. Summer ranges are primarily at higher elevations in sub-alpine habitats, whereas winter ranges are generally at lower elevations, where snow accumulation is low, in areas dominated by sagebrush-grassland habitats.

The corridor analysis area supports 3,362 acres of bighorn sheep crucial winter range and no acres of parturition range. It is located within the Jackson bighorn sheep herd unit BS 107. The 2011 population estimate was 454 individuals and the trend was stable or increasing from the early 2000s. The 5 year (2007-2011) population average was 410 sheep (WGFD 2011). Diseases operating within the Jackson herd during winter 2013 contributed to significant population losses (D. Brimeyer, WGFD, pers. comm.).

Gray Wolf

This species was found throughout Wyoming prior to European settlement, but was exterminated from the western United States by the 1940s. Wolves were classified as endangered in 1967 under the *Endangered Species Preservation Act of 1966*. In 1974, the northern Rocky Mountain wolf subspecies was listed as endangered under the *Endangered Species Act of 1973*, as amended. In 1994, the Wyoming population was classified as "nonessential experimental," in preparation for the reintroduction of the gray wolf into Yellowstone National Park. Wolf reintroduction in the Greater Yellowstone Ecosystem occurred in 1995 and 1996 when 31 wolves were released in Yellowstone National Park. Populations became quickly established within two years of reintroduction. Packs first appeared in Jackson Hole in 1998.

During March, 2008, the U.S. Fish and Wildlife Service published a final rule removing gray wolves from *Endangered Species Act* protection. However, a federal court restored gray wolf protection under the Act and the Service's regulatory responsibility during July, 2008. The gray wolf was listed and discussed as a Forest Service Intermountain Region Sensitive Species when the FEIS and Record of Decision for winter elk management were published. Although the Service published a direct final rule delisting wolves in Idaho, Montana and parts of Oregon, Washington and Utah in May, 2011, management authority for wolf populations in Wyoming remained with this federal agency.

In September 2012, the Service published a final rule removing *Endangered Species Act* protections and transferring management authority to the state of Wyoming. After concluding that the wolf population was stable, threats were minimized, and post-delisting monitoring and management were sufficient, the Service determined that scientific and commercial data indicated gray wolves (*Canis lupus*) in Wyoming were recovered (USFWS 2012). The delisting process included thorough review by the US Fish and Wildlife Service and was peer reviewed on two separate occasions by independent wolf scientists.

At the time of the September, 2012 delisting, Wyoming's wolf population was robust—the numerical, distributional, and temporal recovery goals established by the U.S. Fish and Wildlife Service (USFWS) had been exceeded for ten years. During 2011, at least 328 wolves in more than 48 packs (including more than 27 breeding pairs) inhabited Wyoming, including Yellowstone National Park (Jimenez et al. 2012).

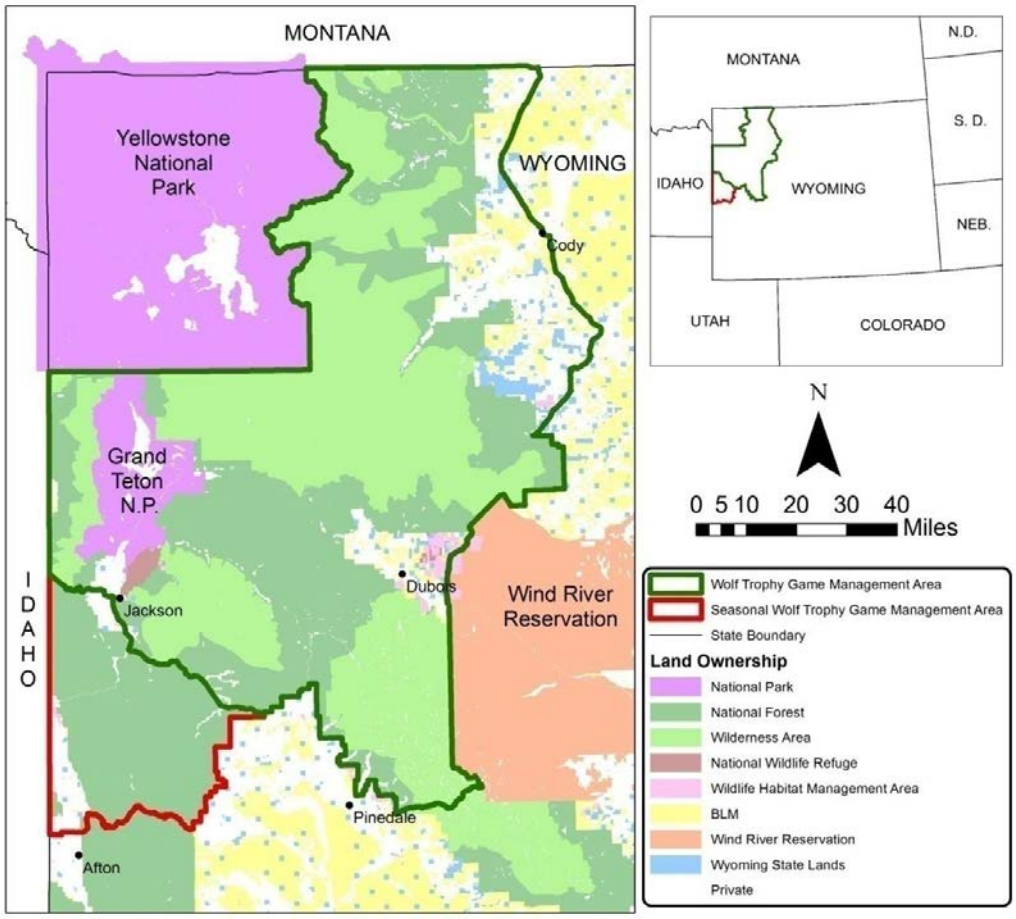

Figure 15: The Wolf Trophy Game Management and Seasonal Trophy Game Management Areas in Wyoming

Wyoming's wolf population objective is to maintain at least 10 breeding pairs and at least 100 wolves within the state outside Yellowstone National Park and the Wind River Reservation, which are areas where the Wyoming Game and Fish Commission lacks management authority. Breeding pairs and wolves with territories predominantly inside Yellowstone Park and the Reservation do not count toward Wyoming's wolf population objective, but are counted towards the Greater Yellowstone Area population. Wolves within Grand Teton National Park and the National Elk Refuge count towards Wyoming's objective because wolf packs that inhabit these jurisdictions are trans-boundary packs. All population objectives refer to the number of wolves and breeding pairs present on December 31 of the respective calendar year.

Under state management, wolves in Wyoming are to be managed under a dual classification system. Wolves in northwest Wyoming are designated and managed as Trophy Game Animals with regulated hunting seasons and hunt areas (Figure 15 from the WGFD website, January, 19, 2013).

Here, wolves may not be taken using leg-hold traps or snare devices. In the rest of the state, wolves are designated as Predatory Animals. In the "Predator Zone", wolves may be taken by any means and at any time with some caveats, including strong limits on the use of poisons set forth by U.S. Environmental Protection Agency regulations.

The Alkali Creek feedground occurs in the Crystal Creek gray wolf management area and on the south side of the Gros Ventre River. The Crystal Creek Unit together with the Rim gray wolf hunt area to the south encompasses most of the Gros Ventre Wilderness. The Fish Creek management area geographically opposes the Crystal Creek unit and encompasses nearly all of the tributaries to the Gros Ventre River on the north. Please see the WGFD website for wolf hunt areas and predator areas on the BTNF at http://wgfd.wyo.gov/web2011/wildlife-1000380.aspx.

An important mortality factor for wolf packs is the hunting (mortality) quota set by the state of Wyoming, an action that contributes to the cumulative effects associated with the proposed action. For 2012, the quotas established for Crystal Creek, Rim, and Fish Creek gray wolf hunt areas were two, seven, and two wolves, respectively. Hunting seasons in western Wyoming opened on October 1, 2013 and closed December 31, 2012, including the Crystal Creek unit. As of 2011, territories of about six different wolf packs overlapped or occurred peripherally to the Alkali Creek feedground and the wolf management areas. As of January 2013, the Upper Gros Ventre, Lava Mountain, and Blackrock Packs use the Alkali Creek feedground area. The Blackrock Pack is new and is not shown in Figure 16.

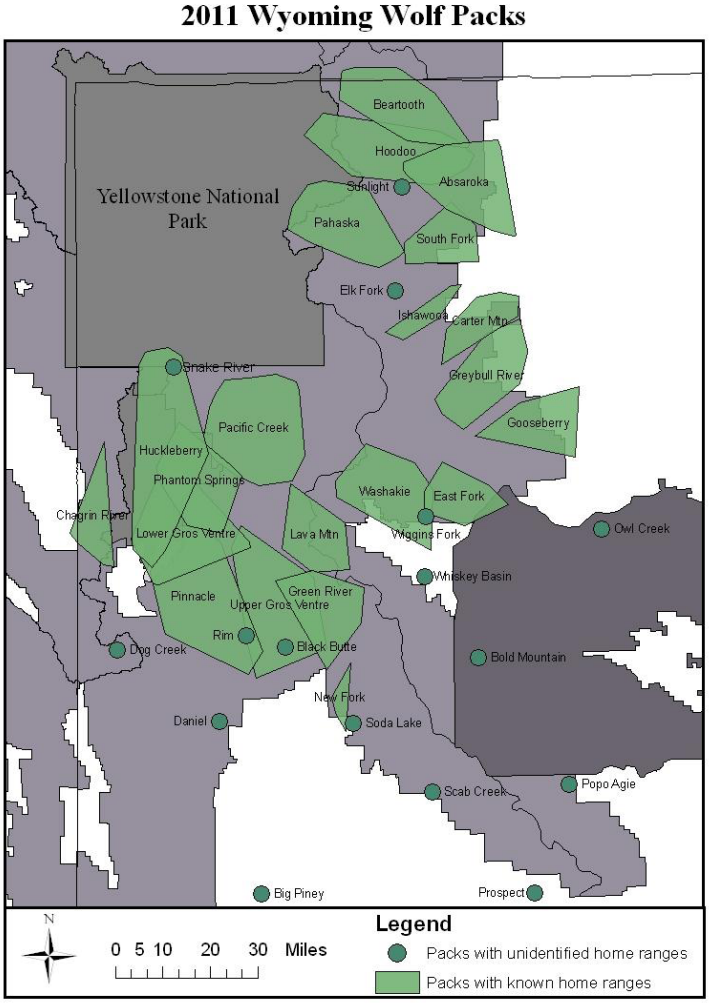

Figure 16: Wolf Pack Territories in Wyoming, December 2011; From Jimenez 2011

In addition to hunter-caused mortality, wolf mortality resulting from responses by the U.S. Fish and Wildlife Service to livestock depredation was (and will likely remain under state management) a significant source of mortality for wolves in areas of where wolves overlap private, state, and federal lands that support domestic sheep and cattle (Jimenez et al. 2012). The Alkali Creek feedground occurs within the Upper Gros Ventre cattle allotment and near several other allotments and forage reserves in the Gros Ventre watershed.

Bald Eagle

Bald eagles are closely associated with water, and their nest sites are commonly found less than one mile from a lakeshore or riverbank. Large trees are necessary to support eagle nests. Alternate nests are commonly found within, or in close proximity to, the stand containing the nest. Old-growth stands, with their structural diversity and open canopies provide important habitat for eagles because snags and open-canopied trees located near the nest site and foraging areas offer favorable perches. Bald eagles with access to open water or alternate food sources near their nesting territories may not migrate in winter; however, many eagles migrate southward to areas with available prey.

Although no population surveys are conducted in the Gros Ventre watershed, bald eagles are common there yearlong. Here, carrion is an important food source, particularly during the winter. This species is not a common scavenger of elk carrion at the Alkali Creek or other Gros Ventre feedgrounds, but likely benefits from the elk that use the feedground and subsequently die by chance in the analysis area. There are currently two active nests in the watershed, one located at Lower Slide Lake (lower Gros Ventre watershed) approximately 200 yards from the main Gros Ventre Road and one at Upper Slide Lake (west of Patrol Cabin), within 100 yards.

Greater Sage Grouse

The greater sage grouse is an upland bird that is entirely dependent upon sagebrush communities for all stages of its life cycle. Sage grouse have high fidelity to their seasonal habitats (breeding, late brood-rearing, and wintering habitats), and females commonly return to the same areas to nest each year. Seasonally important habitats include dense stands of sagebrush and riparian meadows.

Sage grouse in the Gros Ventre watershed provide important demographic and genetic connectivity with larger populations in Jackson Hole proper (100–200 males) and the Upper Green River watershed. The corridor analysis area includes provides potential winter, nesting, and brood rearing habitat for sage grouse. About 11,450 acres of sagebrush, the primary vegetation type used by the species, is located within the corridor analysis area. Specific information about sagebrush in the area around the Alkali Creek feedground is found in the Vegetation Resources section of this document. The nearest breeding leks (main—Breakneck; satellite—Dry Cottonwood) are located at Breakneck Flats, 6.6 air miles northeast of Alkali Creek feedground and 2.1 miles northeast of Patrol Cabin feedground. These sites are accessible only on foot, but occur close (less than 200 yards) to a road where snowmobile access is permitted during the breeding season. From 2000 to present, the number of males counted at Breakneck Flats and Dry Cottonwood ranged from 21 in 2000 to 14 in 2012, with an overall average at both sites of 21 (Upper Snake River Basin Sage Grouse Working Group unpublished data, project record).

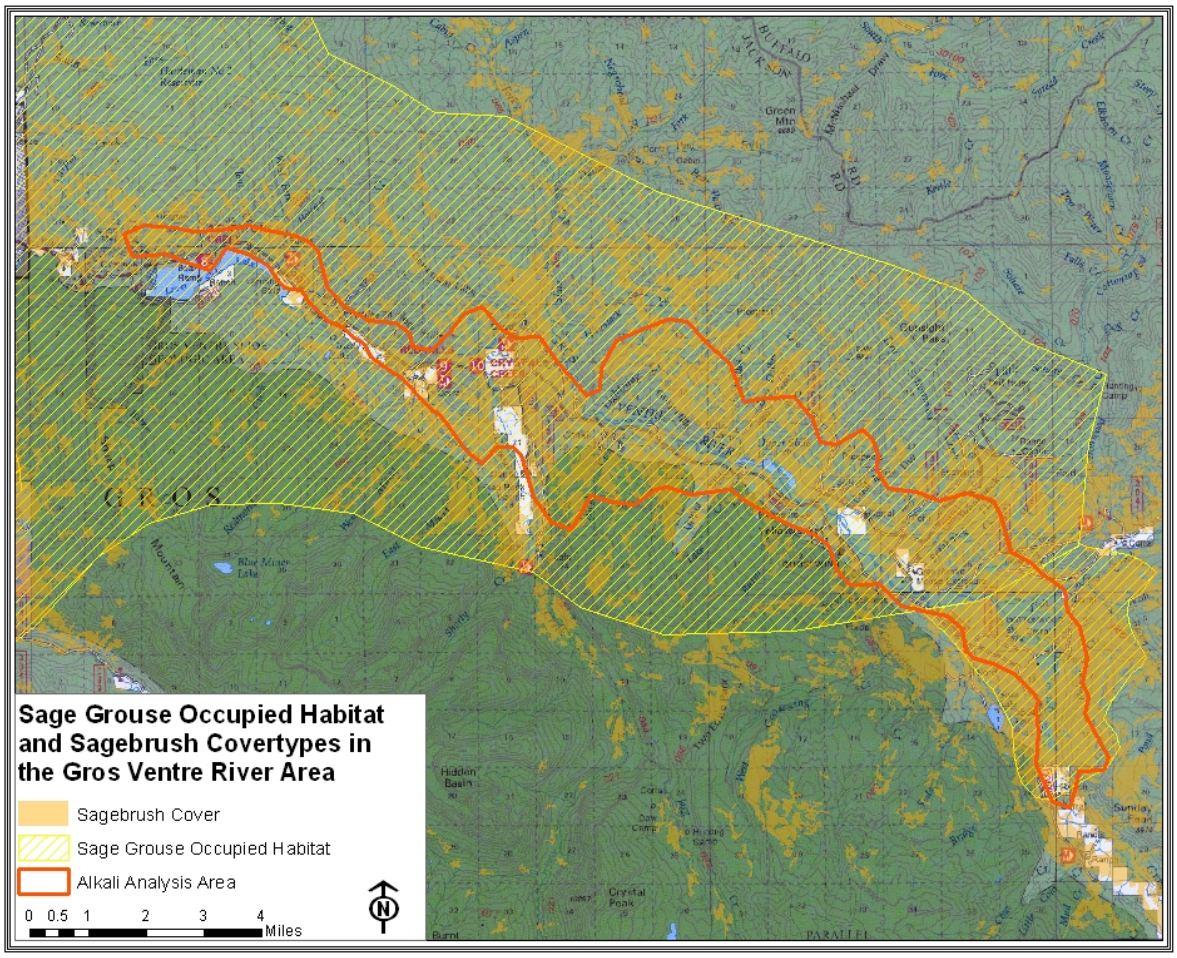

Figure 17: The Corridor Analysis Area, Occupied Sage Grouse Habitat, and the Distribution of Sagebrush Communities in the Gros Ventre Watershed

Great Gray Owl

The great gray owl inhabits the boreal and montane climatic zones of North America and Eurasia. In North America, its range extends from central Alaska and Canada south to central California, the northern Rocky Mountains, northwestern Minnesota, and south-central Ontario. It is a year-round resident in Wyoming, primarily in the mountainous areas in the western third of the state, including the Bridger-Teton National Forest (Hayward and Verner 1994).

This species inhabits mixed coniferous forests usually bordering small openings or meadows. It is generally associated with lodgepole pine, Douglas fir, spruce fir, and aspen forests. Semi-open areas where small rodents are abundant, and that occur near dense coniferous forests for roosting and nesting, are optimum habitat for great gray owls. They prefer mature or old growth forests on flat or moderate slopes for nesting and high crown cover for security (Duncan 1997), using broken top snags, stumps, dwarf-mistletoe platforms, or old hawk and common raven nests as nesting structures (Bull and Duncan 1993). Dense stands of smaller diameter trees are also used for roosting by adults and their young. They forage primarily in wet montane meadows and older open forest stands with a high density of pocket gophers and voles.

The great gray owl is designated as a Forest Service Sensitive Species for 11 of 16 National Forests in U.S. Forest Service Region 4, including the BTNF. The Wyoming Game and Fish Department classifies it as a Species of Special Concern with a Native Species Status of 4 because its population status and trends are unknown, although expected to be stable. Because its habitat is restricted and vulnerable, timber harvesting can reduce and eliminate nest sites. Open or clearcut areas provide good foraging habitat for great gray owls if snags are left within the openings to be used as perches (Bull and Duncan 1993).

Great gray owls occur in suitable habitat throughout the Jackson Hole area, including the corridor analysis area (BTNF observation records). Wet meadows, riparian zones, and forblands that provide vole and pocket gopher prey in proximity to conifer and aspen stands (perching) are common and in good ecological condition, particularly on the north side of the Gros Ventre River where livestock grazing is absent. Cattle grazing on the south side of the river have impacted several potential foraging sites, particularly near water sources and Forest system trails at low (less than 7,500 feet) elevation. The recent Red Rocks (9,670 acres) and Gray Hills fires (2,468 acres) near the Alkali Creek feedground likely eliminated some great gray nest platforms, but improved foraging habitat by reducing conifers in and adjacent to meadows. However, these fires had little overlap with the corridor analysis area. The Alkali Creek feedground site offers excellent foraging and perching habitat for the species owing to the presence of a wet meadow and abundant perch sites.

Northern Goshawk

Goshawks typically nest in mature to old-growth forests composed primarily of large trees (Reynolds et al. 1982; Speiser and Bosakowski 1987; Squires and Ruggiero 1996), with high (60–90 percent) canopy closure. High canopy closure is one of the most uniform habitat characteristics of goshawk nest stands (Hayward and Escaño 1989). Although the habitat-use and preferences of foraging goshawks are poorly understood for North American populations, they generally forage in diverse habitats ranging from open-sage steppes to dense forests, including riparian areas (Squires and Reynolds 1997). Recent spatial analysis of 15 nest territories on the Bridger-Teton National Forest using 2007 forest vegetation layer found an average of 70 percent forest cover within an estimated foraging area of 6,000 acres surrounding known nest trees (S. Patla, WGFD, unpublished data). Average goshawk home range sizes during nesting are 1,400–8,600 acres in North America, depending on sex and habitat characteristics (Squires and Reynolds 1997).

The Northern goshawk is designated as a Forest Service Sensitive Species for all 16 National Forests in Region 4. Population trends for the goshawk are poorly understood. Forest management activities such as logging and fuels reduction have the potential to negatively impact goshawk populations (Squires and Reynolds 1997).

Goshawk habitat is present throughout the corridor analysis area, although no extensive surveys for breeding pairs have been recently conducted. Extensive conifer stands south of the Gros Ventre Road and Alkali Creek feedground offer high quality nesting and foraging habitat. A goshawk nestling (call) was identified in the East Goosewing Creek watershed six miles east of Alkali Creek feedground in 2012. The area is not impacted by timber sales. The Red Rocks and Gray Hills fires (2011) reduced some nesting habitat for the species at intensively burned sites.

Boreal Owl

Boreal owls are generally associated with dense, mature and old growth subalpine forests dominated by subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmanni*) (Scott 2004). They also often occur in other conifer (e.g., lodgepole pine; *Pinus contorta*) and mixed-conifer aspen forests that support inclusions of mature subalpine forests and may forage in forest openings. In the western United States, subalpine forests occur as islands, or natural extensions of the more expansive and continuous boreal forests common in western Canada and Alaska (Knight 1994). Subalpine forests naturally have a patchy distribution due to topographic variation and disturbances such as fire, insects, and diseases. This conifer type is typically associated with high canopy cover, cool ambient temperatures, and high relative humidity (Knight 1994). In western Wyoming, subalpine forests typically occur above 8,000 feet in elevation, with stringers extending to low elevations along stream courses. They are often bordered by Douglas fir and/or lodgepole pine forests, sagebrush steppe, or grassland steppe at low elevations, and by alpine habitats and white-bark pine (*Pinus albicaulis*) at high (9,500 feet) elevations.

The Wyoming Natural Diversity Database (http://www.uwyo.edu/wyndd/reports-and-publications/) lists no historic or current observations of the species within the Gros Ventre watershed. Although not detected, the species may occur in the extensive conifer and aspen forests south of the Alkali Creek feedground and south of the entire extent of the main Gros Ventre Road. Boreal owls have been detected opportunistically and during occasional surveys conducted by Forest staff and biologists of other agencies. Coordinates for four boreal owl locations estimated (Veg2007 GIS model) for the vicinity of Wilson, Wyoming (Recreation Trails, Phillips Bench; BTNF surveys) were associated with lodgepole pine mixed forest (one site), Douglas fir mix (one), and spruce-fir forests (two). Estimated canopy cover was more than or equal to 50 percent at the four locations, with the tree diameter sizes more than 5 inches for three sites, and more than 10 inches for one site.

Boreal owls prey on voles, mice, shrews, pocket gophers, squirrels, and chipmunks. Also taken are small birds, such as dark-eyed juncos, red crossbills, American robins, mountain chickadees, common redpolls, kinglets, and woodpeckers; and insects, especially crickets (references in Hayward 1994). Weasels, woodrats, and juvenile snowshoe hares are occasionally taken.

Peregrine Falcon

This species typically hunts and nests near wetlands, large bodies of water, or rivers that support abundant avian prey such as ducks, shorebirds, or songbirds that they catch midair. For nesting, peregrines use vertical cliff habitats that support holes or ledges that are inaccessible to land predators.

A peregrine nest (intermittent breeding) occurs in the vicinity of Lower Slide Lake, approximately eight miles east of Alkali Creek feedground and within the corridor analysis area. Several cliff bands 1.5–4.5 miles to the north and northwest of the feedground (Grey, Red, and Lavender Hills) also provide potential nesting habitat. Riparian habitats along the Gros Ventre River (north of Alkali), and conifer and aspen stands nearby provide potential prey such as mallard and goldeneye ducks, gray jays, and mourning doves. Peregrine habitats in the corridor analysis area are in good ecological condition, save for some riparian and meadow sites near water and trails on the south side of the Gros Ventre River that are impacted by cattle grazing.

Neotropical Migratory Birds

Neotropical migratory birds use a variety of habitats in the corridor analysis area, including riparian-herb (262 acres), aspen and aspen-conifer mix (26 acres), willow (262 acres), mountain shrub (23 acres), grass-forb (2,032 acres) and cottonwood (20 acres) communities. The area also supports 514 acres of wetlands mapped in the National Wetland Inventory, excluding open water. These communities provide nesting habitat, hiding and thermal cover, and food (insects, seeds and vegetation) for birds. The water bodies provide a source of free water and food for aerial insectivores.

On January 10, 2001, President Clinton signed Executive Order 13186 (Federal Register, Vol. 66, No. 11, 2001, project record) which outlines responsibilities of federal agencies to protect migratory birds under the *Migratory Bird Treaty Act*. The Order requires each federal agency whose actions have or are likely to have, a measurable negative effect on migratory bird populations to develop a Memorandum of Understanding (MOU) with the United States Fish and Wildlife Service (USFWS). In December of 2008, a *MOU between the Forest Service and the USFWS to Promote the Conservation of Migratory Birds* was signed (USFS 2008). Pursuant to the Executive Order and the MOU, the USFS shall ensure that environmental analyses of Federal actions required by NEPA evaluate the effects of actions and agency plans on migratory birds, with emphasis on: 1) species of management concern along with their priority habitats; and 2) species of conservation concern.

Species of Management Concern are identified in the Bridger-Teton National Forest Plan (USFS 1990) as directed by the *National Forest Management Act* and its implementing regulations (36 CFR 219.19). Species of Management Concern on the Bridger-Teton National Forest include Threatened and/or Endangered Species, Forest Service Sensitive Species designated by the Intermountain Regional Forester, and MIS designated by the Bridger-Teton Forest Plan. These species are also birds protected by the *Migratory Bird Treaty Act*.

Birds of Conservation Concern are identified in the MOU between the USFS and the USFWS, and are defined in the MOU as those USFWS-listed migratory and non-migratory birds of the United States and its territories that are of conservation concern. The list is published and maintained by the USFWS, Division of Migratory Bird Management (USFWS 2008). The current version of the list is available at http://www.fws.gov/migratorybirds. The Bridger-Teton National Forest is located within the Northern Rockies Bird Conservation Region (BCR 10).

The *Atlas of Birds, Mammals, Amphibians, And Reptiles in Wyoming* (WGFD 2009) was used as a guide to evaluate bird presence in the corridor analysis area (Table 16). Nongame Biologist S. Patla, Wyoming Game and Fish Department, reviewed the list of species on March 8, 2013. Of the twenty two bird species of conservation concern listed for BCR 10, fifteen were known or suspected to regularly occur there. Five of these were addressed as MIS or Forest Service Sensitive Species in the Environmental Consequences section and were not addressed further as MTMB. The remaining nine BCR species were not of management concern and were addressed in detail as MTMB.

Table 16: Species in Bird Conservation Region 10 and their Occurrence in the Gros Ventre Watershed

Species	Known or Likely Present in Gros Ventre Watershed?	General Habitat Description
Bald Eagle	Y	See Forest Service Sensitive Species section.
Swainson's Hawk	Y	Most habitats below 9,000 feet with open areas for foraging. Nests in a tree, occasionally on a cliff. Feeds mostly on small mammals.
Ferruginous Hawk	N	Basin prairie shrublands and mountain foothills grasslands; rock outcrops; cottonwood-riparian. Nests on a rock outcrop, the ground, a bank, or in a tree. Feeds mostly on small mammals. Unlikely in the Corridor analysis area.
Peregrine Falcon	Y	See Forest Service Sensitive Species section.
Upland Sandpiper	N	Eastern great plains grasslands, dry-land grass pastures. Nests in a depression on open ground, usually concealed by grass. Feeds on insects, terrestrial invertebrates, seeds. Unlikely in the Corridor analysis area during the breeding season.
Long-billed Curlew	Y	Sagebrush-grasslands; mountain foothills, and wet-moist meadow grasslands; irrigated native meadows; with aquatic areas nearby. Nests on the grounds near water, sometimes in a moist hollow. Feeds on insects, aquatic invertebrates.
Yellow-billed Cuckoo	Y	See Forest Service Sensitive Species section.
Flammulated Owl	Y	See Forest Service Sensitive Species section.
Black Swift	N	Small islands of breeding populations in Intermountain West. Nests on ledges or shallow caves in steep rock faces and canyons, usually near or behind waterfalls, and in sea caves. Ranges widely to forage over both forest and open areas in montane habitats. Unlikely in the Corridor analysis area during the breeding season.
Calliope Hummingbird	Y	Coniferous forests, woodland chaparral, mountain-foothills, shrublands, riparian shrub, mountain park-meadows, alpine grasslands. Uses many habitats during migration. Nests on a limb of a tree or on a conifer cone. Feeds on nectar, insects.
Lewis's Woodpecker	Y	Ponderosa pine savannah, pine-juniper, other coniferous forests, aspen, cottonwood-riparian, below 8500 ft. Nests in a cavity in a dead or live tree or in a pole. Feeds on insects, nuts, and berries.
Williamson's Sapsucker	Y	Coniferous forests, especially those that have burned. Also aspen. Nests in a cavity in an aspen, pine, or fir. Feeds on insects, tree sap.

Species	Known or Likely Present in Gros Ventre Watershed?	General Habitat Description
White-headed Woodpecker	N	Coniferous forests from 4,000 to 9,000 feet. Feeds on insects, conifer seeds. Unlikely in the Corridor analysis area during the breeding season.
Olive-sided Flycatcher	Y	Coniferous forests from 8,000 feet to timberline, aspen-riparian. Nests often high in a conifer on a horizontal branch. Feeds exclusively on insects that can be caught in the air.
Willow Flycatcher	Y	Riparian shrub including willow, hawthorn, water birch, alder; below 9,000 feet. Nests in an upright or slanting fork in a shrub. Feeds primarily on insects, occasionally berries.
Loggerhead Shrike	Y	Pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands. Nest is usually hidden below the crown in the crotch or on a large branch of a deciduous tree or shrub. Feeds on insects, small vertebrates, carrion.
Sage Thrasher	Y	Basin-prairie and mountain-foothills shrublands. Nest is concealed in or beneath a sagebrush shrub. Feeds on insects, some fruit.
Brewer's Sparrow	Y	See Management Indicator Species section.
Sage Sparrow	N	Basin-prairie and mountain-foothills shrublands. Usually nests in or under sagebrush. Feeds on insects, seeds. Not a breeding resident in the Corridor analysis area.
McCown's Longspur	N	Eastern great plains and great basin foothills, grasslands, basin-prairie shrublands, agricultural areas. Nests on the ground in a shallow, natural or scraped depression. Feeds on seeds, insects. Unlikely in the Corridor analysis area.
Black Rosy-Finch	N	Alpine grasslands, alpine moss-lichen-forb, barren ground, fallow agricultural areas. A variety of habitats during the winter. Nests on the ground or on a cliff. Feeds on seeds, insects. Unlikely in the Corridor analysis area during the breeding season.
Cassin's Finch	Y	Coniferous forests up to timberline, including burns. Lower habitats during the winter, especially urban areas. Nests in a conifer; nest is usually placed near the end of a large limb. Feeds on buds, berries, and conifer seeds.

Light gray: species of conservation concern considered elsewhere; Dark gray: carried forward for detailed analysis; No shading: species not carried forward because of species' rarity in the area or lack of habitat in the corridor analysis area. Reviewed by S. Patla, Nongame Biologist, Wyoming Game and Fish Department, March 9, 2013

ENVIRONMENTAL CONSEQUENCES

Harvest Management Indicator Species

Harvest MIS species include elk, mule deer, moose, bighorn sheep, and pronghorn. Bighorn sheep is discussed under Forest Service Region 4 Sensitive Species.

Effects on Harvest MIS Common to Both Alternatives

Elk

Winter elk management activities performed by the WGFC include feeding elk, which increases the winter survival rate. Feeding is expected to continue under both the No Action and the Proposed Action alternatives, although in Alternative 1-No Action, activities would no longer occur at Alkali Creek feedground.

The artificial concentration of elk during winter and early spring perpetuates the disease brucellosis, caused by the bacterium *Brucella abortus* (Thorne et al. 1978). Transmission of *Brucella* typically occurs orally when cattle and/or elk come into contact with infected aborted fetuses, fetal membranes and fluids, or uterine discharges (Thorne et al. 1982; Cheville et al. 1998). Brucellosis seroprevalence of elk on feedgrounds averages 22 percent, while brucellosis seroprevalence in elk from herd units adjacent to feedgrounds varies from 0 to 22 percent. Elk completely independent of feedgrounds have no prevalence of the disease (Scurlock and Edwards 2010). Brucellosis infections in cattle can impact Wyoming's brucellosis free status, resulting in increased testing requirements and potential trade sanctions on Wyoming's cattle producers. A major role of elk feedgrounds today is to reduce the commingling of elk and cattle for concerns over elk-to-cattle brucellosis transmission. Thus, elk feedgrounds maintain the disease in elk while limiting elk-to-cattle transmissions at the same time. For further details see Appendix 2, *Elk Feedgrounds in Wyoming* (WGFD 2004).

Various disease management efforts are implemented on elk feedgrounds during winter. *Brucella* strain 19 vaccination of calves is conducted annually. Vaccination occurs in late January to March and is typically conducted by the feeder. Only calves are vaccinated and typically 100 percent of the calves on the feedground are inoculated.

The WGFD also monitors the distribution and prevalence of brucellosis on 4-6 feedgrounds a year during winter. A permanent elk trap exists on Alkali Creek feedground. Elk are trapped until a sufficient sample size for 85 percent confidence level for brucellosis exposure rate is reached.

The elk-to-elk brucellosis exposure rate would not change under any alternative because elk would continue to be fed and artificially concentrated during the brucellosis transmission period. Under both alternatives, the WGFC continues to feed elk on federal or other managed lands and maintain elk population numbers according to their management plans. Brucellosis-induced abortions would likely continue and calf production would be reduced by up to 5 percent. (Oldemeyer, Robbins, and Smith 1993, as adjusted for lower seroprevalence in recent years). This translates to a small loss in elk numbers overall, as adults do not generally die from brucellosis (Dobson and Meagher 1996) and the herd itself has a high intrinsic potential to increase (Lubow and Smith 2004). No impacts on the distribution of elk in the Jackson herd unit are expected as the result of brucellosis under either alternative.

Brucellosis can cause lameness in chronically infected adult elk and may increase winter deaths of a small percentage of infected elk through predation or starvation (Thorne et al. 1982). Few, if any adult elk deaths related to brucellosis would be expected, and impacts on adult mortality would be negligible.

No direct impacts on elk mortality, production, and recruitment are expected under either alternative as a result of lungworm infection. Necrotic stomatitis is not a transmissible disease. Thus, transmission between elk would not occur under either alternative.

Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy presumably caused by a proteinase-resistant isoform (PrP^{CWD}) of the prion protein (a normal cellular sialoglycoprotein; Spraker et al. 2002). The known natural hosts for CWD are North American cervids: mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), Rocky Mountain elk (*Cervus elaphus nelsoni*) and moose (*Alces alces*; Williams et al. 2002; Kreeger et al. 2006). Disease can be induced in other species through intracerebral inoculation of PrP^{CWD} (Sigurdson et al. 2008), but these data do not imply that such species are naturally susceptible to CWD. It is unlikely that CWD can be transmitted to humans (Kong et al. 2005) or domestic livestock (Kreeger et al. unpubl. data). Chronic wasting disease is considered invariably fatal to the natural hosts, but this has not been proven under conditions of natural exposure.

Although PrP^{CWD} has been found in skeletal (Angers et al. 2006) and heart (Jewell et al. 2006) muscles, saliva, blood (Mathiason et al. 2006), and feces (Safar et al. 2008), it is unknown how PrP^{CWD} is naturally transmitted from an infected host to a susceptible animal. Artificial transmission has been achieved through oral (Sigurdson et al. 1999) or intracerebral (Williams and Young 1992) inoculation using brain suspension from CWD-infected cervids.

Prevalence of CWD in free ranging populations can be as high as 45 percent in white-tailed deer (Edmunds, unpubl. data), 40 percent in mule deer, and 12 percent in elk (Kreeger, unpubl. data). Slightly higher prevalences have been observed in captive cervids (Peters et al. 2000). Mathematical models have implied that such high prevalences would result in noticeable population declines (Gross and Miller 2001). However, model predictions of CWD leading to declining abundance, or even local extinction, have not occurred anywhere in free-ranging cervid populations (Peterson 2005). This could be due to inadequacies of the model (Schauber and Woolf 2003; Peterson 2005).

The model of Gross and Miller (2005), combined with high prevalences both in captive and wild populations, have led to concerns that when CWD is found in elk frequenting state and federal feedgrounds in Wyoming that this would inevitably result in catastrophic population declines. At this time, there are no empirical data to support this conclusion. Conversely, preliminary evidence in captive elk suggests that elk can maintain very high prevalences of CWD without a concomitant population decline if allowed to reproduce (Kreeger, unpubl. data).

Peterson (2005) suggested that "preventing CWD from becoming established in the Greater Yellowstone Area is a far better option than dealing with it once it is there," yet goes on to say that "options for managing CWD once it exists in free-roaming cervid populations are practically nonexistent." Chronic wasting disease is well-established in Wyoming and Colorado, having existed there for at least three decades. In these states, as well as in Wisconsin and Saskatchewan, all management strategies to stop the spread of CWD have failed. Therefore, it is probable that CWD will be found in elk in northwestern Wyoming at some point in time and there appears little that wildlife management agencies can do to prevent this.

However, management strategies possibly can be employed to slow the spread of CWD, such as reducing prevalence to reduce transmission (Gross and Miller 2001). Although prevalence has been reduced by culling free-ranging populations in some areas (e.g., Colorado), it has failed in others (e.g., Wisconsin; Stuiber et al. 2006). Even if culling was practical and effective in reducing prevalence, it would not prevent the migration of infected cervids which would establish the disease in new areas. Infected white-tailed deer have been observed to travel over 100 miles (Edmunds, unpubl. data), thus rendering any "buffer zone" strategy ineffective.

Chronic wasting disease may be best represented as an epizootic with a protracted time-scale (Miller et al. 2000) and it is probable that it will spread throughout Wyoming. Management strategies to prevent its spread are limited or non-existent. Management actions that appear to be somewhat effective in slowing the spread of CWD include: 1) reducing/eliminating CWD from the captive cervid industry to prevent inadvertent movement of the disease into new areas; 2) surveillance of hunter-killed cervids to discover new areas of infection; and 3) cervid population reduction in new CWD areas to prevent establishment of the disease. The WGFC has adopted a plan for management of CWD, which is attached as Appendix 3.

There are currently no empirical data to support the contention that CWD in elk utilizing winter feedgrounds will result in catastrophic, or even observable, population declines.

The potential effect of CWD on elk populations is similar for all alternatives in this analysis because the WGFC will continue to feed elk on federal lands or other locations on state or private lands as near to the current site(s) as possible.

Cumulative effects to elk populations as a result of winter elk management activities at all feedgrounds are discussed in the WGFD report, *Elk Feedgrounds in Wyoming*, in Appendix 2.

Other Harvest MIS: Mule Deer, Moose, and Pronghorn

Brucellosis may be transmitted to other ungulates, but aside from bison, these species are most likely dead end hosts (Davis 1990; Thorne 2001). Brucellosis is not expected to directly adversely impact populations of these species (Thorne et al.1982; Disease Expert Meeting 2002), and these species are not expected to transmit the disease to other species or conspecifics. Bison and elk do not interact on the Alkali Creek feedground. Therefore, under all alternatives, no direct impacts to these species would occur as a result of brucellosis transmission from elk managed at the feedground. Similarly, transmission of other diseases, including pasteurellosis, necrotic stomatitis, psoroptic scabies, lungworm, and viral microparasites are not expected from elk to other ungulates in either alternative.

Chronic wasting disease, if it became established, could affect moose to some degree, but moose social behavior reduces its potential to contract the disease. Pronghorn would not be directly impacted under any of the alternatives because they do not seem to be susceptible (Williams, Kirkwood and Miller 2001). Mule deer are susceptible to chronic wasting disease, which is always fatal (Williams and Miller 2002). It is possible that a high prevalence of chronic wasting disease in elk could result in increased transmission from elk to mule deer and/or increased environmental contamination, which could potentially increase the prevalence in mule deer. Further details about CWD are found in the WGFD's *Chronic Wasting Disease Management Plan* located in Appendix 3.

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action Alternative)

Elk - Direct and Indirect Effects

Elk numbers were used as a direct indicator of the effects this alternative has on elk populations and habitat conditions in the Jackson elk herd unit. Elk numbers and health are not expected to be affected by closure of Alkali Creek feedground. If winter elk management were discontinued at Alkali Creek feedground, elk would likely use the Patrol Cabin or Fish Creek feedgrounds, or the Wyoming Game and Fish Commission would establish alternative winter elk management locations off of National Forest System lands. Winter elk management is expected to continue to occur at Patrol Cabin feedground on lands adjacent to the BTNF.

This alternative would eliminate human disturbance to elk at and near the feedground site as well as along its access (main Gros Ventre and spur) roads. This would not greatly benefit "habituated" elk that currently use feedgrounds in the Gros Ventre watershed, but elk that exclusively rely on native winter range and that are sensitive to human disturbance use the Alkali area in the absence of human activity.

Although the elk-to-elk brucellosis exposure rate does not vary by alternative, the potential for elk-to-cattle brucellosis exposure does vary. In Alternative 1, elk are likely to leave National Forest System lands and seek feed on lower elevation private lands and the National Elk Refuge. Cattle are wintered on private land between Alkali Creek feedground and the National Elk Refuge. Elk-to-cattle brucellosis exposure potential would be higher in the No Action alternative than in Alternative 2.

Because both alternatives in this analysis project that WGFC would continue to feed elk on other federal, state, or private lands, the potential exposure and infection rate of CWD is common to all alternatives. However, current research on captive elk indicates that the captive environment may become contaminated with the CWD prion. In the No Action alternative, National Forest System lands at Alkali Creek would be unlikely to become contaminated with these prions in densities suitable for disease transmission.

Under this alternative, relief from concentrated elk herbivory associated with winter feedground operations at Alkali Creek would have a positive local (less than 750 meters of the feedground site, see Vegetation Resources section) effect on elk fall, summer, and late spring range. The cover of herbaceous species would decrease and the cover of woody browse such as aspen and mountain shrubs such as serviceberry and chokecherry would increase on these seasonal ranges. These changes would have mixed effects on elk, a species that uses both herbaceous and woody browse. Elk that do not use feedgrounds during the winter (up to 2,000 individuals, see data provided in direct and indirect effects for wolverine) would experience an increase in the availability of natural forage near the feedground site during this season.

Elk - Cumulative Effects

The corridor analysis area was chosen to define the spatial scale of analysis because this area encompassed nearly all of the effects of elk herbivory that are spatially and temporally linked to feeding operations at Alkali Creek feedground. Similarly to direct and indirect effects, elk numbers are used as the indicator to gauge the effect of the actions on elk populations and habitat conditions in the Jackson elk herd unit.

The principal actions that affect elk in the corridor analysis area include feedground management at Patrol Cabin and Fish Creek and its related effects of elk herbivory, elk herd and wolf population management by the Wyoming Game and Fish Commission, livestock grazing, and prescribed fires. Feedground management at Patrol Cabin and Fish Creek feedgrounds and hunting regulations applied to within the Gros Ventre watershed would continue to result in approximately the same number of wintering elk that occur presently, approximately 3,200 individuals. This number would likely vary with weather conditions and the effects of wolves, a primary elk predator in this area. Severe winter and spring weather and wolf predation would decrease calf survival, and potentially decrease elk numbers. Wet summers and reduced wolf populations through regulated wolf pack management would contribute to improved survival of calves and fecundity of adults. Rates of wolf predation on elk wintering in the corridor analysis area would not change under this alternative because the Patrol Cabin and Fish Creek feedgrounds are in close proximity and would remain operational.

Feeding at Patrol Cabin and Fish Creek feedgrounds has and would continue to affect vegetation conditions in the vicinity of those feedgrounds. As with the case for Alkali Creek feedground, concentrated elk herbivory in these areas would locally decrease woody species and increase herbaceous forage on elk late spring, summer, and early fall ranges.

The corridor analysis area overlaps seven livestock allotments (3,204 total acres) that occur principally on the south side of the Gros Ventre River. Cattle use the allotments from early summer to early fall. Competition for herbaceous forage in upland (e.g., grass and sagebrush), riparian (sedges), and deciduous-shrub communities may occur between elk and cattle, particularly at some sites along Forest Service system trails and at water sources used intensively by cattle. Cattle decrease forage availability for elk which use the area yearlong. Cattle also graze private lands along the Gros Ventre River and main Gros Ventre Road. Livestock grazing is likely to continue.

Eleven prescribed fires covering 4,518 total acres (range 3 to 767 acres) were managed in the corridor analysis area during the preceding 30 years, primarily as tools for wildlife habitat enhancement. The burns promoted early successional communities on elk winter range by stimulating aspen growth, reducing cover of dense sagebrush and conifers, and increasing grass. These treatments were intended to improve foraging conditions for wintering elk and other ungulates. They occurred on the north side of the Gros Ventre River. Other factors that potentially affect elk in the corridor analysis area include motorized use of roads by the public (winter snowmobile and summer automobile) and agency personnel, and dispersed camping (summer).

This analysis considered the contribution of the cumulative actions (direct and indirect effects relative to the past, present, and future actions described above) to the effects of the No Action alternative on elk at the herd (Jackson) unit scale. The threshold for the analysis was the herd unit objective. Here, the question is whether or not the alternative in question contributes to achieving the objective for populations within the respective herd unit, accounting for the cumulative actions.

The Jackson elk herd unit encompasses nearly all of Jackson Hole and includes the Gros Ventre watershed. Population and harvest data were provided on the Wyoming Game and Fish website at http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/JCR_BGJACKSON_ELK. The population objective for the unit was 11,000 elk. The current population model estimated 11,692

elk for the end of the 2011 hunting season, a value within 10 percent of the objective. The modeled population declined from 2004 (15,200 elk) to 2012 (11,900), with the population declining less sharply from 2011 to present.

Discontinuing feedground management at Alkali Creek would have little impact on elk numbers because elk in the Gros Ventre watershed would continue to be fed at the Patrol Cabin and Fish Creek feedgrounds. Although the absence of feedground operations at Alkali would increase the difficulty of controlling elk movements within the watershed, including occasional visits of Gros Ventre elk to the National Elk Refuge, feeding at these two other sites alone would not lead to reduced numbers of elk. Thus, this alternative would contribute to the other cumulative actions that have, to date, supported a population that is currently very near its objective. If elk numbers dramatically increase elsewhere in the herd unit, this alternative would contribute to elk numbers that are above objective for the herd unit.

Mule Deer, Moose and Pronghorn - Direct and Indirect Effects

Similar to the MIS section concerning elk (above), numbers of mule deer, moose, and pronghorn were used as a direct indicator of the effects this alternative would have on their respective populations and habitat conditions.

This alternative would reduce human activity at the Alkali Creek feedground, particularly during the winter and summer seasons when feeding operations and hay stocking would occur. Removing the hay barn and the corral as part of this alternative during the summer would have only minor disturbance effects on these species because removal operations would be limited to the feeding site for a short time (several days) and to roads used to access the site. The removal of facilities during the summer would have no effect on pronghorn migration through the area when it occurs during the spring and fall.

If winter elk management was discontinued at Alkali Creek feedground, elk would shift their use to the Patrol Cabin, Fish Creek, or other feedground location developed on private land. Vegetation would increase in diversity and shrub densities at the Alkali Creek feedground and within a 750 meter radius. Observations on other previously fed areas suggest that vegetation would revert to a more natural, pre-feeding condition after 20-30 years (Dean and Hornberger 2006). Some of the aspen (616 acres) and willow (1,512 acres) stands in the corridor analysis area would recover over time; changes would benefit mule deer and moose that use this area seasonally. Conditions for pronghorn near the feedgrounds would decline because infill of aspen and mountain shrub cover would decrease distances pronghorn can see without obstructions. Pronghorn prefer open environments. However, the shift of elk to other feedgrounds under this alternative would shift herbivory pressure and physical damage to vegetation to these sites, a change that would counterbalance the positive vegetation changes at Alkali Creek. Because herbivory effects are concentrated near the feedgrounds, habitat conditions throughout most of the corridor analysis area (Gros Ventre River corridor) would remain suitable for the three species.

Closing Alkali Creek feedground would not affect rates of wolf predation on moose (and moose numbers overall) during the winter because wolves packs that use the Gros Ventre watershed are well familiar with the feedgrounds and can readily locate this alternative prey regardless of the arrangement and number of feedgrounds. Few moose use the willow communities between Alkali and Fish Creek feedgrounds and this is unlikely to change while Patrol Cabin and Fish Creek feedgrounds remain operational.

Under this alternative, relief from concentrated elk herbivory associated with winter feedground operations at Alkali Creek would have a positive local (less than 750 meters of the feedground site) effect on moose and mule deer fall, summer, and late spring ranges. The cover of herbaceous species would decrease and the cover of woody browse such as aspen and mountain shrubs such as serviceberry and chokecherry would increase. These changes would have minor negative effect on pronghorn, a species that prefers open habitats. Moose that occasionally use the area around the feedgrounds during the winter would experience an increase in the availability of natural forage during this season. Mule deer and pronghorn do not use the area during the winter.

Mule Deer, Moose and Pronghorn - Cumulative Effects

The spatial and temporal scope of the cumulative effects corridor analysis area was defined and the same indicator was used as for elk. The cumulative actions in the corridor analysis area, as well their respective effects on the three species, were also the same as described for elk.

This analysis considered the contribution of the cumulative actions (direct and indirect effects relative to the past, present, and future actions described above) to the effects of the No Action alternative on mule deer, moose and pronghorn at the herd unit scale. The threshold for the analysis was the herd unit objective. Here again, the question is whether or not the No Action alternative contributes to achieving the objective for populations within the respective herd units, accounting for the actions described in the cumulative effects section. Table 17 summarizes the population conditions for the herd units that encompass the Gros Ventre watershed.

Table 17: Population Conditions (2011) for Mule Deer, Moose, and Pronghorn for the Herd Units that Encompass the Corridor Analysis Area

Species	Herd Unit	Population Objective	2011 Population Estimate (Model)	Population Size Relative to Objective (%)	Population Trend
Mule deer	Sublette	32,000	20,825	-35%	Declining since 2007
Moose	Jackson (Jackson Hole)	3,600	896	-75%	Declining since 2006
Pronghorn	Sublette (Gros Ventre and Green River)	48,000	37,800	-21%	Sharp decline from 2010

Discontinuing feedground management at Alkali Creek would have little impact on achieving the respective herd objectives for mule deer, moose, and pronghorn because elk in the Gros Ventre watershed would continue to be fed at the Patrol Cabin, Fish Creek, or other feedgrounds in the watershed. Some minor changes in the spatial distribution of herbivory and habitat conditions in the corridor analysis area would occur as a result of elk shifting to other feedgrounds. However, these effects would impact individual animals with home ranges that currently encompass Alkali

Creek feedground (recovering local habitat) or other (habitat declining) feedgrounds, but would not rise to the level of major population effects for any of the three species. This is because the spatial scale of the effects associated closing the Alkali Creek feedground is much smaller than processes such as weather, wildfires, and predators, which affect ungulate population sizes across entire herd units. Similarly, the mix of livestock grazing, recreation, and prescribed fires (actions in cumulative effects above) that have and would likely continue to occur in the corridor analysis area have little effect at the herd unit scale. Implementing the No Action alternative is not expected to affect population trends of mule deer, moose, and pronghorn within their respective herd units.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Elk - Direct and Indirect Effects

As in the No Action alternative, elk numbers were used as a direct indicator of the effects of this alternative on elk populations and habitat conditions in the Jackson elk herd unit.

Feedground operation results in human disturbance to elk at and near the Alkali Creek feedground and along the roads (main Gros Ventre and spur road) used to access the site. The elk that consistently forage on the hay dispensed at the feedgrounds in the Gros Ventre watershed are habituated to human activity, that is, they show little response to human activity and are little affected by the disturbance. However, elk that exclusively use native winter range in the area (see direct and indirect effect on wolverine for elk counts) would be negatively affected by the human presence and noise associated with snowmobiles. These individuals would be displaced from the feedground area and access roads.

Similarly to the No Action alternative, implementing this alternative would not affect elk numbers in the corridor analysis area. Feeding operations would continue to successfully enhance elk nutrition and improve fecundity and yearlong survival. This positive effect would occur regardless of the negative, persistent effect on amount of forage provided by aspen and mountain shrubs near the feedground. Because wolves are highly mobile, their frequency of elk predation and its effect on elk numbers would not vary with the number and distribution of feedgrounds in the area. Wolf-packs have, or readily develop knowledge of feedground locations and routinely travel among them to successfully locate elk prey.

If CWD is transmitted through prions in the feedground environment, Alkali Creek feedground could become a reservoir for CWD infection if it becomes established in elk populations in Northwest Wyoming. However, the effect of a CWD infection on elk numbers in the Gros Ventre watershed does not change between the two alternatives because other feedgrounds in the area would remain operational.

Concentrated elk herbivory associated with winter feedground operations at Alkali Creek would have a local (less than 750 meters of the feedground site, see Vegetation Resources section) effect on elk fall, summer, and late spring range. The cover of herbaceous species would increase and the cover of woody browse such as aspen and mountain shrubs such as serviceberry and chokecherry would decrease on these seasonal ranges. The effects of elk herbivory and trailing would extend up the river corridor as far as the Fish Creek feedground due to movement of Alkali elk to this location, but would be difficult to distinguish from the effects of the other

feedgrounds. The effects of elk down-river to the National Elk Refuge would be very minor because Alkali Creek feedground management, by design, would limit movement in this direction.

Elk that do not use feedgrounds at least some time during the winter (up to 2,000 individuals, see data provided in direct and indirect effects for wolverine) would experience a decrease in the availability of natural forage near the feedground site during this season.

The potential for elk-to-cattle brucellosis transmission would be low because elk would be held on the BTNF, reducing intermingling with most private land livestock operations.

Elk - Cumulative Effects

The same set of past, present, and reasonably foreseeable actions; temporal and spatial scope, indicator, and threshold were used to evaluate the cumulative effects of this alternative on elk as were used for analysis in the No Action alternative. Population conditions for the Jackson elk herd (encompasses the corridor analysis area) are described in direct and indirect effects for elk above.

This alternative would help support numbers of wintering elk in the corridor analysis area that continue to maintain the Jackson elk herd at or near its present level and near the population objective of 11,000 elk. In the event that elk numbers dramatically increase elsewhere in the herd unit in the future (e.g., as identified in winter counts at the National Elk Refuge), this alternative would contribute to a population in the herd unit that is over objective.

Mule Deer, Moose and Pronghorn - Direct and Indirect Effects

Alternative 2 would increase human disturbance to these species at the feedground site, particularly during the winter when feeding operations would occur, and during the summer when the hayshed would be stocked. However, few moose occur in this area during the winter (see Affected Environment, moose) and nearly all pronghorn and mule deer that use the area during the summer use winter ranges outside the Gros Ventre watershed. This alternative would have no disturbance-related effects on pronghorn migration through the Gros Ventre watershed because there is no temporal overlap of feeding operations and pronghorn movement. Feedground facilities such as the shed and corral are far too small to deter the trajectory of long distance movement, as pronghorn can easily walk around the facilities. The feedground site is in the Pronghorn Migration Corridor, but most migratory movement in this portion of the watershed occurs on the north side of the Gros Ventre River.

This alternative would lead to habitat conditions that are less favorable for mule deer and moose (browsers) during the spring, summer, and fall; particularly at and near the feedground site. This effect stems from elk herbivory on woody species during the winter.

Similarly to the situation for Alternative 1, the proposed action would not affect rates of wolf predation on moose (and moose numbers overall) during the winter because wolf-packs that use the Gros Ventre watershed are familiar with the feedgrounds and can readily locate this alternative prey regardless of the arrangement and number of feedgrounds.

Mule Deer, Moose and Pronghorn - Cumulative Effects

The same set of past, present, and reasonably foreseeable actions; temporal and spatial scope, indicator, and threshold were used to evaluate the cumulative effects of this alternative on mule deer, moose, and pronghorn as were used for analysis of elk.

This analysis considered the contribution of the cumulative actions (direct and indirect effects relative to the past, present, and future actions described above) to the effects of the No Action alternative on mule deer, moose and pronghorn at the herd unit scale. The threshold for the analysis was the herd unit objective. Table 17 summarizes the population conditions for the herd units that encompass the Gros Ventre watershed.

For moose and mule deer, this alternative contributes negatively toward achieving the herd objectives because it creates less favorable habitat conditions (less woody browse) for the two species, and thus carries negative consequences for survival and fecundity at the scale of individual animals. Because both the moose (Jackson) and mule deer (Sublette) herds are currently below objective, this alternative moves population numbers in a different direction than desired by the Wyoming Game and Fish Commission. However, because most important feedground-related habitat effects occur at a small spatial scale (within 750 meters of the sites and extending up the river corridor; few individuals are affected) as compared to the natural and human-caused factors that operate at the herd unit scale (hundreds or thousands of individuals), the effects of this alternative on achieving population objectives are insignificant.

With respect to pronghorn, this alternative improves habitat conditions by impeding development of deciduous woody vegetation. Because the Sublette pronghorn herd is below objective, this alternative contributes to the desired population trend. Again however, the positive effect on pronghorn habitat occurs at very small scale compared to those that operate on entire herd units; thus the contribution of this alternative toward the population objective is insignificant.

Ecological Management Indicator Species

The only Ecological MIS wildlife species potentially affected by this project are the American marten and the Brewer's sparrow.

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action Alternative)

North American Marten - Direct and Indirect Effects

Eliminating feedground management at Alkali Creek would improve foraging conditions for martens in open meadows, riparian areas, sagebrush communities, and aspen stands. Herbaceous (grass, forb and sedge), sagebrush, mountain shrub, and tree cover would improve at Alkali Creek feedground and its vicinity (within 750 meters of the feeding site and extending up the river corridor), a change that would positively affect marten prey such as voles, red squirrels, and small birds. However, this positive effect would be minor because martens prefer mature and old growth conifer stands (see data in existing conditions for marten). Martens generally avoid habitats that lack overhead cover (Buskirk and Ruggerio 1994).

Eliminating feedground operations would carry few disturbance-related (human) effects or mortality risks for martens because no operations would occur under this alternative, save for removing feedground facilities that occur in an open area and outside typical pine marten habitat.

North American Marten - Cumulative Effects

The 62,543-acre Upper Gros Ventre North 6th order hydrologic unit code (HUC) was used as the spatial extent of the cumulative effects analysis. This area is large enough to encompass the effects of elk herbivory at Alkali Creek feedground, its vicinity, and the Gros Ventre River corridor between Alkali Creek and Patrol Cabin feedgrounds. This area is also large enough to encompass numerous marten home ranges (up to 3,800 acres—Buskirk and McDonald 1989) and extensive mature forest stands (preferred by the species) that occur south (upslope) of Alkali Creek feedground and the Gros Ventre River corridor as a whole.

Cumulative actions relevant to pine marten during the preceding 30 years included five prescribed fires (1,479 total acres) in the area. Fires carry some positive, long term (more than 30 years) effects on marten habitat because they can improve vegetation diversity and structure. However, they also reduce horizontal cover and structure in the forest understory, particularly at sites burned at high intensity (loss of woody debris and ladder fuels) and where residual snags do not accumulate on the ground. These small scale changes, typically less than 10 acres, can negatively affect marten prey such as mice, voles, and small birds; and cover available to hunting marten. Despite this effect, the prescribed fires in this area were too limited (only 1, 479 acres) in spatial extent to have a major negative effect on marten habitat. The 2011 Red Rocks (9,670 acres) and Gray Hills (2,468 acres) wildfires affected marten habitat by consuming a large acreage of mature conifer forest.

Through its effect of creating trails, browsing, and grazing, livestock have the potential to affect habitat quality for typical marten prey; particularly in riparian zones, open meadows, sagebrush communities, and aspen woodlands near water. However, cattle effects are insignificant in typical marten habitat—dense conifer and deciduous forests—because such sites are physically difficult to access and offer little herbaceous forage for cattle. There is one large active cattle allotment (Upper Gros Ventre) that overlaps (9,539 acres) the cumulative effects area. Here, 550 cattle are permitted (about 510 typically present) to graze during the summer and fall grazing season. Two other cattle allotments have little overlap with the Alkali area (less than 5 acres). A forage reserve in the area is not currently active.

Similarly to the direct effects of concentrated elk herbivory on vegetation at Alkali Creek (see Vegetation Resources section; direct and indirect effects above), feedground management at Patrol Cabin and Fish Creek negatively affects marten prey such as voles and small birds that occur at these sites (e.g., voles), and marten that occasionally forage there.

The Wyoming Game and Fish Department has not established population management objectives for this MIS. Thus, the effect of this alternative on population goals cannot be evaluated.

By improving conditions for their prey, the No Action alternative would carry positive effects for marten at or near the Alkali Creek feedground, although these habitats are less valuable to marten than mature conifer forests. Similarly, the negative effects of cattle grazing, prescribed fires (at intensively burned sites), and the other feedgrounds are limited in spatial extent. Closing the Alkali Creek feedground would compensate (slightly) for the cumulative actions and contribute positively to the marten population in the Upper Gros Ventre North HUC. However, relief from herbivory effects associated with discontinuing feedground management would not measurably benefit mature and old growth forests because herbivory effects do not extend into these habitats.

Brewer's Sparrow - Direct and Indirect Effects

The physical condition (height, breadth, and structural diversity) and amount of sagebrush in the corridor analysis area was used as indicators of the effects of this alternative on Brewer's sparrows.

Brewer's sparrows are migratory, and do not occur in the area during winter. Thus, few direct effects to Brewer's sparrows are expected from the No Action alternative, except for the removal of facilities such as the Alkali hayshed and corral during the summer or fall. Such effects would be temporary and minor because of the short time required to remove facilities (days) and limited spatial extent (at the site and along transport roads) of the disturbance.

Due to a reduction in elk herbivory and trailing in sagebrush communities, habitat conditions in the corridor analysis area would improve over time for Brewer's sparrows if the Alkali Creek feedground was not permitted, particularly in the area surrounding the feeding site. Individual sagebrush plants and their coverage would improve as described in the Vegetation Resources and Hydrology Resources sections of this document. Relief from herbivory and trampling of sagebrush would improve numbers of sparrows in the corridor analysis area.

Brewer's Sparrow - Cumulative Effects

The corridor analysis area was used to define the spatial scale of the analysis because this area encompassed nearly all of the elk herbivory and trailing effects associated with this alternative. The physical condition and amount of sagebrush were used as indicators of the effects of the actions described below.

The cumulative actions that affect Brewer's sparrows in the corridor analysis area include livestock trailing, prescribed fires, vehicle use on roads, off road vehicle use, recreation trails and off-trail travel (e.g. antler hunting), dispersed camping, and existing feedground management (Patrol Cabin and Fish Creek). For Brewer's sparrows, these actions carry negative direct (human-caused disturbance and mortality risk) effects on the population or negative indirect (herbivory, trampling) effects on its habitat. Prescribed fires and existing feedground management in the corridor analysis area has reduced the coverage of sagebrush.

The table below displays data about management actions and affected acres in the Corridor analysis area.

Table 18: Characteristics of Cumulative Actions Identified for Brewer's Sparrow

Acres of National Forest System Lands within the Project area	0 Acres Alt 1 91 Acres Alt 2
Sagebrush habitats	11,451 acres
Active grazing allotments	3,402 acres
System roads	45 miles
System trails	6 miles
Dispersed recreation and camping or used for administrative uses	Common along the main Gros Ventre Road and some side roads

Population and habitat objectives for this Ecological Management Indicator have not been established by the Wyoming Game and Fish Department or the Bridger-Teton National Forest. Using the current estimated amount of sagebrush habitat in the corridor analysis area as a threshold, the contribution of the direct and indirect effects relative to the cumulative actions was evaluated. The effects of the No Action alternative were inferred on the species at the BTNF scale.

If the Alkali Creek feedground were closed, the amount of sagebrush habitat would increase throughout the corridor analysis area, and particularly near the feedground. This positive effect would help counterbalance the negative effect of actions in Table 18. However, increases in sagebrush habitat would principally occur at and near (within 750 meters, see Vegetation Resources section) the feedground, as compared to the effects of the other actions (e.g., livestock grazing) that occur more broadly across the corridor analysis area.

Because of the improved acreage and condition of sagebrush, the No Action alternative would contribute positively, but slightly, to population increases of Brewer's sparrows on the corridor analysis area and the Bridger-Teton National Forest. Based on surveys conducted on the Buffalo and Jackson Ranger Districts, Breeding Bird Surveys, and surveys conducted by the Rocky Mountain Bird Observatory, this species is common and populations are currently stable or increasing at the National Forest scale.

Because Brewer's sparrows are sagebrush obligates, the slight improvements in the status of this species' population that would result from the No Action alternative would also lead to slight improvements in the coverage and health of sagebrush communities on the Forest overall.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

North American Marten - Direct and Indirect Effects

Alternative 2 would degrade habitat conditions for typical marten prey, particularly near (less than 720 meters) the feedground site where the effects of elk herbivory are strongest. However, the negative effects on marten and their prey would not extend into prime marten habitat upslope of the feedground because deep snow, limited forage, and dense vegetation render the conifer forests there more undesirable to elk than the feedground site.

This alternative would not carry important disturbance effects or mortality risks for marten because feedground operations (feeding and personnel travel) occur outside prime habitat for the species.

North American Marten - Cumulative Effects

The cumulative effects analysis area, temporal scope, and cumulative actions were the same as those identified for marten in the No Action alternative.

This alternative would degrade habitat conditions for marten prey in the vicinity (less than 720 meters) of the feedground site, but the prime habitat upslope of the feedground would be little affected. This alternative would contribute little to the existing local negative effects of cattle grazing, prescribed fires, and other feedgrounds on the marten population and its habitat in the Upper Gros Ventre North HUC. This alternative would have no measureable effect on the

amount and quality of mature and old growth forests for which this species serves as an ecological indicator.

Brewer's Sparrow - Direct and Indirect Effects

The physical condition and amount of sagebrush in the analysis area were used as indicators of the effects of this alternative on Brewer's sparrows. The effects of elk herbivory and trailing would occur principally near the Alkali Creek feedground, and extend up the river corridor as far as the Fish Creek feedground. The effects of elk down-river to the National Elk Refuge would be very minor because Alkali Creek feedground management, by design, would limit movement in this direction.

Only minor direct (disturbance) to Brewer's sparrows are expected from the proposed action because winter elk management would occur primarily outside of Brewer's sparrows' breeding (spring) season. Some disturbance effects to sparrows would occur when the hayshed at the feedground was annually stocked in preparation for winter operations.

The proposed action would carry negative effects on the height and breadth of individual sagebrush plants and the coverage of sagebrush in the corridor analysis area, with effects most visible near the feedground. Elk herbivory would also decrease residual (over-winter) herbaceous vegetation such as grasses and forbs needed by insect prey of the sparrows during the subsequent breeding (spring) and brood-rearing (summer) season.

Brewer's Sparrow - Cumulative Effects

The cumulative effects analysis area, temporal scope, and cumulative actions were the same as those identified for Brewer's sparrows in the No Action alternative.

The proposed action would decrease the amount and quality of sagebrush habitat in the corridor analysis area, particularly near the feedground. This negative effect would further contribute to the negative effect of the actions in Table 18.

Because of the decreased acreage and condition of sagebrush, the proposed action would likely reduce, albeit slightly, numbers of Brewer's sparrows on the analysis area and the Bridger-Teton National Forest. Based on surveys conducted on the Buffalo and Jackson Ranger Districts, Breeding Bird Surveys, and surveys conducted by the Rocky Mountain Bird Observatory, this species is common and populations currently appear to be stable or increasing at the Forest scale (see Affected Environment for Brewer's sparrow). The negative effect of elk herbivory near the Alkali Creek feedground would not contribute to a declining population or degraded sagebrush communities on the Forest.

Threatened Species

This section discloses potential effects to Threatened Species potentially affected by this project. Potential direct, indirect, and cumulative effects are described by alternative. Further analysis of effects to Threatened and Endangered Species including effects determinations, conservation strategies, and recovery guidelines and goals, is included in the Biological Assessment located in the project record.

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action Alternative)

Canada Lynx and Designated Critical Habitat - Direct and Indirect Effects

The direct and indirect effects of the No Action and Proposed Action alternatives are displayed in Table 19. Removal of the hayshed and other facilities currently at the site would locally reduce impediments to lynx travel through matrix habitat, a primary constituent element of lynx critical habitat (see Affected Environment). However, these structures likely have little current effect on lynx travel because of their small size, collectively about one acre.

Under Alternative 1, relief from concentrated elk herbivory near the feedground would increase horizontal cover afforded by recovering aspen and mountain shrubs, and improve conditions for snowshoe hares and lynx foraging. Heights, recruitment, and vigor of aspen and shrubs would improve. Thus, the No Action alternative would move vegetation conditions at and near the feedground toward those described for a second primary constituent element of critical lynx habitat that addresses habitat needs of snowshoe hares (see Affected Environment).

However, due the natural absence of dense coniferous forest cover and deep snow favored by lynx and their principal winter prey, the snowshoe hare, the Alkali Creek feedground and its immediate vicinity does not naturally provide most of the primary consistent elements of lynx critical habitat (see habitat components in Affected Environment section above). Vegetation cover at the feedground and vicinity includes mostly grasslands, sagebrush steppe, wet meadows, and scattered stands of aspen and conifers. An increase in the height and distribution of trees and shrubs would likely occur in the absence of feedground activity at the feedground itself, and extending to 750 meters from the feedground perimeter (WGFD 2011). Removal of elk would not dramatically improve habitat conditions for lynx foraging and denning, and for snowshoe hares—analogous sites at the same elevation and aspect adjacent to the feedground do not provide prime habitat conditions for lynx. The feedground site was also not mapped as lynx habitat under guidelines of the *Lynx Conservation and Assessment Strategy* (Ruediger et al. 2000).

Table 19: Comparison of the No Action and Action Alternatives on Canada Lynx and Their Habitat

Factor	No Action alternative	Action Alternative
Human-caused lynx mortality—Potential for mortality through vehicle (snowmobile) strikes by feedground personnel (-).	In the absence of feedground management, this effect would not occur.	This effect is highly unlikely to occur even with feedground management because lynx are rare in the watershed.
Human disturbance—Potential for human activity and travel associated with feedground operations may displace lynx from the site and interrupt vital actives such as foraging (-).	This effect would not occur.	This effect is highly unlikely with feedground management because lynx are rare in the watershed.

Factor	No Action alternative	Action Alternative
Barriers to travel—Structures in the feedground potentially cause lynx to avoid travel through the area, reducing its value as linkage habitat (-).	Removal of the hayshed and other structures, and recovery of woody vegetation such as aspen in the feedground area would improve opportunities for lynx travel, but insignificantly.	Feedground management (retention of facilities and local effects on vegetation) would carry minor, negative effects on lynx travel. Ample conifer forest south of the feedground is readily available for use as a travel corridor.
Competing predators—Snow compaction may facilitate movement and forage competition between lynx and other predators (Reudiger et al. 2000) (-).	In the absence of feedground operations, snow compaction would be reduced due because elk would disperse and snowmobile travel associated with feedground operation would cease - a minor positive effect.	Feedground management would increase snow compaction, facilitating competition with coyotes for prey such as snowshoe hare and ruffed grouse.
Designated Lynx Critical Habitat—see the Affected Environment for a description of the primary constituent elements of lynx habitat.	This alternative would improve the constituent elements of lynx habitat by increasing the quality of snowshoe hare habitat and opportunities for lynx travel in habitat that affords cover.	By reducing horizontal cover in the area of the feedground and maintaining some facilities, this alternative would detract from the quality of lynx critical habitat.
Objectives and standards for habitat management in the Northern Rockies Lynx Management Direction (U.S. Forest Service 2007):		
Objective O1. Manage livestock grazing to be compatible with improving or maintaining lynx habitat— Elk herbivory is similar to livestock grazing because it decreases horizontal cover available to lynx and their primary winter prey, the snowshoe hare (Reudiger et al. 2000) (-).	Horizontal cover afforded by recovering aspen and mountain shrubs would slightly improve conditions for snowshoe hares and lynx foraging. This alternative is consistent with objective.	Feedground operations would reduce horizontal cover afforded by trees, shrubs, and woody debris. This alternative is inconsistent with the objective, but negative effects would be largely local (750-meter radius from the feedground).
Guideline G1. In fire- and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating—The effects of elk herbivory extend into the area burned by the 2011 Red Rocks fire, aspen, willow, and shrub-steppe habitats near the feedground. Guideline G2. In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.	Heights, recruitment, and vigor of aspen and shrubs would improve in the absence of feedground management. Consistent with the four guidelines. Same as in G1.	Elk herbivory would reduce recruitment of aspen and shrubs in the feedground area This alternative is inconsistent with the guideline, but the effect would be local (750-meter radius around the feedground). Same as in G1.

Factor	No Action alternative	Action Alternative
Guideline G3 In riparian areas and willow thickets, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	Same as in G1.	Same as in G1.
Guideline G4. In shrub-steppe habitats, livestock grazing should be managed ... to maintain or achieve a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	Same as in G1.	Same as in G1.

Canada Lynx and Designated Critical Habitat - Cumulative Effects

The 62,543-acre Upper Gros Ventre North Lynx Analysis Unit, previously identified under guidance of the *Lynx Conservation Assessment Strategy* (Ruediger et al. 2000), was the area defined for cumulative effects analysis. Lynx Analysis Units provide the relevant spatial scale for several vegetation management standards in the *Northern Rockies Lynx Management Direction Record of Decision* (USFS 2007).

Cumulative effects relevant to lynx critical habitat during the preceding 30 years included five prescribed fires (1,479 total acres) within the Upper Gros Ventre Lynx Analysis Unit. Although fire carries positive, long term (more than 30 years) effects on lynx habitat by altering vegetation diversity and structure (Ruediger et al. 2000), it may locally reduce horizontal cover at ground level and denning opportunities over the short term, particularly at sites burned at high intensity and where residual snags do not accumulate on the ground as cover. Despite several of these short-term negative effects, the prescribed fires in this Unit were too limited in spatial extent to have a major effect on lynx critical habitat in this area. Livestock grazing on Forest Service and private lands in the area, and concentrated elk herbivory at and near the Patrol Cabin and Fish Creek feedgrounds, reduce horizontal cover available for snowshoe hares and lynx, but these effects also occur at a small scale.

Canada Lynx and Designated Critical Habitat Determination

Through its effect of increasing cover provided by vegetation and the removal of facilities, the No Action alternative would carry minor, positive effects on lynx and lynx critical habitat, although the site would still not provide ideal foraging and denning habitat. Although the combined effect of the cumulative actions identified above would be negative for lynx, the No Action alternative itself would offset them by improving habitat conditions for snowshoe hares

and lynx. Regardless, this alternative would not greatly improve habitat conditions for lynx in the cumulative effects analysis area or the Bridger-Teton National Forest.

With respect to a determination made in the Biological Assessment prepared during Section 7 consultation with the U.S. Fish and Wildlife Service, the determination for the No Action alternative would be "**no effect**" on the Canada lynx and Revised Designated Critical Lynx Habitat.

Grizzly Bear - Direct and Indirect Effects

In the absence of feedground management, no attractants such as elk carrion or human food (accidently provided by feedground personnel) would be available at the feedground. However, elimination of the feedground would likely not improve the dispersion of elk carrion across native winter range because the same elk would concentrate at the Patrol Cabin and Fish Creek feedgrounds, also located in the Gros Ventre watershed. Elk readily shift among the three feedgrounds in the Gros Ventre watershed due to predation pressure by wolves (Jimenez 2003). Closure of the Alkali Creek feedground, coupled with strong wolf predation pressure at the two remaining feedgrounds, might also cause some elk to winter at the National Elk Refuge, leaving less food for bears in the Gros Ventre watershed during early spring.

Under this alternative, the short spur road that accesses the feedground from the main Gros Ventre Road would be closed to all motorized travel from December 1 to May 30 and would receive little or no administrative use. There would be no feedground-related disturbance effects (feeding operations, including the use of snowmobiles or wagons for access) to the few grizzly bears that might use the feedground vicinity simultaneously with feedground operations, that is, from mid-March to mid-April. Removal of the barn and corrals during the summer, and use of access roads for this operation, could carry short-term, minor disturbance effects to grizzly bears.

In this alternative, there would also be minor changes in vegetation cover and composition associated with relief from herbivory and trampling by feedground elk. These changes would have a small, positive effect on foraging bears because of improvements to vegetation at and near the feedground, including a one-acre riparian zone. This positive effect would stem from increased coverage of grasses and forbs used by the occasional grizzly bear that uses low-elevation sites in the watershed during the spring.

Grizzly Bear - Cumulative Effects

The 325,000-acre Gros Ventre Range Bear Analysis Unit is the spatial scale appropriate to define the boundaries of the cumulative effects analysis area. With some exceptions, boundaries for this unit are coincident with those of the Gros Ventre watershed, an area large enough to potentially encompass ranges of at least one grizzly bear. Analysis units are used to monitor changes in road density and secure habitat for grizzly bears outside the Primary Conservation Area (Interagency Grizzly Bear Study Team 2007).

Factors that have previously affected (and would continue to affect) grizzly bears in the analysis area include roads open for motorized access and activities on federal, state, and private lands such as the management of developed campgrounds, dispersed camping, livestock grazing, and hunting seasons. These factors reduce habitat security and expose grizzly bears to attractants, such as human food or livestock, which ultimately increase grizzly bear mortality risks. However, these effects, albeit negative, are minor because relatively few grizzly bears occur where there are active cattle allotments. During a three-week live-trapping session in summer

2012, the Wyoming Game and Fish detected and captured only a single grizzly bear in the upper Gros Ventre watershed. During a management action, a female with cubs was captured along the Gros Ventre by the Department in spring 2012, but she left the watershed soon thereafter (M. Boyce, WGFD, pers. comm.).

Numerous changes in the allowable summer travel for motorized vehicles that were implemented on the Jackson Ranger District have recently (from 2009) improved grizzly bear habitat security. Changes in hunting season structure in 2007 and 2008 that reduced hunting opportunities in the Gros Ventre watershed have also reduced hunter numbers in the fall and thus potential conflicts with grizzly bears.

There are 17 different cattle and sheep allotments, totaling 133,565 acres, on the Jackson or Pinedale Ranger Districts that are fully or partially within the Gros Ventre Range Bear Analysis Unit. These allotments have (and would likely continue to) indirectly contribute to grizzly bear morality because bears that prey on cattle and sheep are often removed (euthanized or translocated) as part of conflict management by the Wyoming Game and Fish Department. Removal of grizzly bears for livestock depredation on cattle allotments on the Buffalo and northern portion of the Jackson Ranger District (north of the Gros Ventre Unit) were common from the 1980s to the early 2000s, but closure of several allotments in 2007 or conversions to forage reserve status have nearly eliminated livestock as a potential food source for grizzly bears in this area.

From 1985 to 2011, 27 reported conflicts between grizzly bears and humans (property damage, cattle depredations, garbage, and other sources) occurred in the Gros Ventre Range Bear Analysis Unit (2010 WGFD unpublished grizzly bear conflict data, project record). Two grizzly bears died as a result of direct interactions with humans during this time, one in 2008 (human self-defense; adult male grizzly) and one in 2009 (illegal shooting; adult female). In May 2012, a grizzly bear killed a domestic cow along the Gros Ventre Road during a cattle drive across Forest Service land to a private grazing pasture, resulting in an unsuccessful effort to capture and document the bear's management history (M. Boyce, pers. comm.). In view of expected future increases in grizzly bear numbers in the Gros Ventre Bear Analysis Unit, conflict management and human-bear encounters would likely continue to result in grizzly bear deaths.

Carrion and ungulate prey is an important food source for grizzly bears in the Yellowstone Ecosystem. By concentrating animals, winter elk management at feedgrounds in the Gros Ventre watershed would contribute to new diseases such as chronic wasting disease becoming established and sustained in the Gros Ventre watershed and the region overall, with the caveat that other feedgrounds would contribute to disease prevalence as well, regardless of management in the Gros Ventre watershed. In the short-term, bears might benefit from a temporary increase in the availability of vulnerable prey and the carrion supply that might result from the appearance of a new disease. However, this factor would be negative for bears over the long-term if it reduced the size of the elk population in the Gros Ventre watershed, elk numbers in the Jackson Hole elk herd, or regional elk numbers. The effect of chronic wasting disease on population dynamics of elk is unknown (Williams et al. 2002). Models suggest a decrease in population density and stability of mule deer following the introduction of chronic wasting disease (Gross and Miller 2001). However, elk populations modeled by Hobbs (2006) did not decline in either the presence or absence of selective predation by wolves. Selective predation by wolves potentially has a strong effect on the prevalence and persistence of chronic wasting disease (Hobbs 2006; Wild et al. 2001).

No other cumulative actions in the Gros Ventre Range Analysis Unit are likely to decrease grizzly bear habitat security or increase mortality risks in the foreseeable future. Much of this area is classified as Wilderness or Roadless, and significant development of new roads and facilities such as campgrounds and ski areas are unlikely. The Jackson Ranger District would continue to implement planned restrictions on motorized use of roads and trails, further improving grizzly bear habitat security.

Grizzly Bear - Determination

In view of the minor reductions in motorized access to the feedground and human activity during the period of overlap between feedground operations and grizzly bear emergence, the No Action alternative would have a minor, positive effect on grizzly bears. This effect would help offset any future losses of grizzly bears stemming from their predation on livestock. The No Action alternative would help support grizzly bear de-listing in the Greater Yellowstone Ecosystem.

With respect to a determination made in a Biological Assessment prepared during Section 7 consultation with the U.S. Fish and Wildlife Service, the determination for the No Action alternative would be "**may affect, not likely to adversely affect**" the grizzly bear.

North American Wolverine - Direct and Indirect Effects

Removal of feedground facilities would carry no mortality or disturbance risks to wolverines because this species is currently rare in the area and the watershed as a whole. Discontinuing feeding would eliminate the concentration of elk during winter, but it would not dramatically improve the dispersion of elk on native winter range because the same elk that currently use the Alkali site would likely concentrate at the Patrol Cabin and Fish Creek feedgrounds, also located in the Gros Ventre watershed. Elk readily shift among the three feedgrounds in the Gros Ventre watershed due to predation pressure by wolves (Jimenez 2003). Thus, feedground closure would also not greatly increase elk carrion available to scavenging wolverines, particularly in high elevation habitats where wolverines are more likely to occur (Inman et al. 2012; Murphy et al. 2011). Carrion of ungulates that die in avalanches or other sources of mortality are an important winter food source for wolverines, but this species does not typically inhabit ungulate winter ranges (Inman et al. 2012; Murphy et al. 2011), and is not among the scavengers such as coyotes, ravens, and magpies that commonly consume carrion at the feedground.

North American Wolverine - Cumulative Effects

The Gros Ventre watershed is the spatial scale appropriate to define the boundaries of the cumulative effects analysis area for wolverines. This area is large enough to encompass the home ranges of 1 or more wolverines (Inman et al. 2012) and the ungulate winter ranges that could provide carrion of moose, bighorn sheep, and an occasional elk during the winter.

The principal human-related actions that potentially affect wolverine in the Gros Ventre watershed are effects on snowpack and summer temperatures related to climate change, and potential human-caused disturbance primarily associated with snowmobile-based recreation during the winter. Other cumulative actions such as summer recreation management, mining, timber harvest, infrastructure and road development in the Gros Ventre watershed are either too limited in spatial extent or have such minor direct or indirect effect on this wide-ranging species that their effect are of little concern (see USFWS 2012 for a discussion of risk factors that apply to wolverines).

Climate change effects wolverines by reducing snowpack needed for denning during winter and early spring, by increasing summer temperatures beyond the species' physiological tolerance, or reducing, the long-term acreage of high-elevation ecosystems upon which wolverines depend. Climate change likely operates to degrade wolverine habitat in the Gros Ventre watershed, but its effects on individual activities such as denning, foraging, and sheltering; and on populations is unclear. (USFWS 2012)

Guided snowmobile tours commonly occur from December to March along the main Gros Ventre Road, with trips extending from the Atherton Campground (lower Gros Ventre watershed) to the Upper Green River area to the east and into the Buffalo Ranger District (upper Spread Creek) to the north. During the 2011–2012 winter, 5 snowmobile tour operators provided snowmobile trips to single groups of 5–6 persons (Outfitter and Guide Actual Use data, BTNF files). Use days for all operators during this winter totaled 1,760 days. Four major snowmobile trails used by the operators and occasionally by the public are restricted to designated routes where they cross ungulate winter range at low elevations and along the main road, but off-trail activity is permitted, particularly at high elevations. Snowmobile activity is not permitted in the Gros Ventre Wilderness.

Although snowmobile recreation potentially carries a negative effect on wolverine foraging and denning, little is known about how the species responds to machine noise and human presence. Wolverines have been documented to persist and reproduce in areas with high levels of human use and disturbance, including areas with snowmobile recreation (Heinenmeyer 2012).

North American Wolverine - Determination

The No Action alternative contributes positively, but little, to the availability of elk carrion available to the occasional wolverine that uses the Gros Ventre watershed, either as an occasional resident of the area (unlikely) or during the course of dispersal to other watersheds. Closure of the Alkali Creek feedground would not increase carrion available to wolverines because the remaining two feedgrounds in the watershed would continue to concentrate elk at low elevations where they are below typical wolverine range. Moreover, closure of the feedground would contribute little to the cumulative actions that could negatively affect wolverines in the Gros Ventre watershed. Overall, the effects of Alternative 1 are minor for wolverines. It would not contribute to the federal listing of this proposed species in the northern contiguous United States.

With respect to a determination made in the Biological Assessment prepared during Section 7 consultation with the U.S. Fish and Wildlife Service, the determination for the No Action alternative for the wolverine would be "**will not jeopardize the continued existence of the species**".

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Canada Lynx and Designated Critical Habitat - Direct and Indirect Effects

As in Alternative 1, the natural absence of most of the primary constituent elements of lynx critical habitat at the Alkali Creek feedground and vicinity precludes the importance of the area as critical lynx habitat. The local effect of feeding elk during the winter would reduce horizontal and vertical cover of shrubs and trees at the feedground and within 750 meters of the feedground

site, further reducing the naturally-limited value for lynx and snowshoe hares. The facilities at the site would be minor impediments to lynx movement because of their small spatial extent (one acre).

Canada Lynx and Designated Critical Habitat - Cumulative Effects

The analysis area, temporal scope, and cumulative actions described for Alternative 1 also apply to Alternative 2.

Canada Lynx and Designated Critical Habitat - Determination

Winter elk management at Alkali Creek feedground, considered collectively with the short-term effects of cumulative actions, would have only a minor, negative effect on lynx and the principal constituent elements of critical lynx habitat at the scale of Lynx Analysis Unit and the Bridger-Teton National forest.

With respect to a determination made in a the Biological Assessment prepared during Section 7 consultation with the U.S. Fish and Wildlife Service, the determination for the Alternative 2 would be "**may affect, not likely to adversely affect**" the Canada lynx and Revised Designated Critical Lynx Habitat.

Grizzly Bear - Direct and Indirect Effects

Elk that die on the feedground serve as attractants that potentially lead bears into conflict with feedground personnel. An average of four elk die on the Alkali Creek feedground each winter (range 0−25 for winters 1976−2011; WGFD 2011b). However, scavengers such as ravens, magpies, bald and golden eagles, coyotes, and red foxes quickly reduce elk carcasses on the feedground to skin, rumen, and bones within several days, leaving essentially no food value for grizzly bears, with the caveat that scattered contents of elk rumens and scattered bones could still serve as attractants.

Human food transported to the site by feedground personnel is potentially an attractant for grizzly bears. A grizzly bear obtained human food from a cooler on March 17, 2012, at the Finnegan feedground (near Big Piney, Wyoming) operated on Bureau of Land Management land. Food storage regulations were not in effect in this area (Z. Turnbull, pers. comm.). In contrast, mortality risks for bears due to anthropogenic food would be low at the Alkali Creek feedground because (1) the period of overlap between spring bear activity and feedground operations is short (four weeks maximum—mid March to mid-April) and food storage regulations would be in effect for the duration, (2) personnel would not use the feedground for over-night lodging (as at Finnegan feedground), and (3) there is no history of grizzly bear visits or human-bear conflicts at Alkali Creek feedground.

Should they become established, pathogens such as chronic wasting disease could affect numbers of elk, an important food source for grizzly bears (Mattson et al. 1991), in the Gros Ventre watershed in both short-term (less than 10 years) and long-term. The effects of the feedground as a supplemental food source on elk and the potential beneficial and negative effects of chronic wasting disease for predators are discussed in more detail as effects of the proposed action on gray wolves (below). Winter feedground management at Alkali Creek would not cause or sustain, *by itself*, important new elk diseases in the absence of the expected future operation of other feedgrounds in the region.

Grizzly Bear - Cumulative Effects

The cumulative effects analysis area, temporal scope, and cumulative actions for Alternative 1 apply here.

Grizzly Bear - Determination

Federal and state actions to remove grizzly bears that prey on livestock (see cumulative effects for Alternative 1) are important past, present, and future (foreseeable) contributors to the cumulative effects of the proposed action. Chronic wasting and other diseases could infect elk at Alkali Creek feedground, but would have a mix of uncertain, short and long-term effects on grizzly bears that use elk as a food source The proposed action could have some adverse impacts on bears if their attraction to the feedground resulted in a human-bear conflict that required removal of the bear from the population. However, the potential risks of winter elk management at the Alkali Creek feedground for grizzly bears would, by themselves, be minor because (1) food storage regulations are in effect during the period of overlap (maximum mid-March to early April) between feedground operations and grizzly bear emergence, and (2) elk carcasses, averaging about four per year at the Alkali Creek feedground, are rapidly depleted by other scavengers and remains are not likely to be strong attractants for bears. Thus, Alternative 2 would not impede the recovery of the grizzly bear population on the Bridger-Teton National Forest or in the Yellowstone Ecosystem.

With respect to a determination made in a the Biological Assessment prepared during Section 7 consultation with the U.S. Fish and Wildlife Service, the determination for the Proposed Action alternative would be "**may affect, not likely to adversely affect**" the grizzly bear.

North American Wolverine - Direct and Indirect Effects

Feeding operations and travel associated with Alkali Creek feedground would cause no mortality risks or disturbance of wolverines because this species is rare in the watershed, particularly at low elevations.

Feedground management at Alkali Creek, together with the Patrol Cabin and Fish Creek feedgrounds that are also in the Gros Ventre watershed, contributes to the concentration of elk at low elevations and near the feedgrounds, reducing the abundance and distribution of elk that use native winter range. Through its effect on winter elk distribution, Alkali Creek feedground thus contributes to a negative effect on the distribution and availability of carrion, an important winter food supply for wolverines. Wolverines typically do not use ungulate winter ranges for foraging, and are not known to visit feedgrounds in the Gros Ventre watershed. However, the effect of Alkali Creek feedground alone on wolverines is minor because in its absence, the other two feedgrounds would still operate, concentrate elk, and decrease the availability of elk that might occasionally use and die in high elevation areas favored by wolverines. Moreover, elk and other ungulates such as moose and bighorn sheep that use native winter range in the Gros Ventre watershed, including some high elevation sites, would continue to provide a food source for wolverine regardless of the feedground effect on carrion distribution. From 2008 to 2012, winter counts of elk off feedgrounds (WGFD) in the middle and upper portions of the Gros Ventre watershed ranged from a low of 229 (in 2010) to a high of 1,938 (in 2008) (D. Brimeyer, unpublished survey data, project record). Numbers of moose counted off of feedgrounds ranged from 35 (in 2009) to 249 (in 2010). Bighorn sheep counts off of feedgrounds ranged from 243 (in 2012) to 417 (in 2011). Although the average elevation of wintering elk (groups) found off of

feedgrounds in the Gros Ventre watershed in 2013 was about 7,500 feet—about the same elevation as the Alkali Creek feedground—some elk ranged up to 9,100 feet (D. Brimeyer, unpublished survey data, project record). Thirty-six observations of one or more elk exceeded 8,000 feet and occurred within the elevation range commonly used by wolverine.

North American Marten - Cumulative Effects

The cumulative effects analysis area, temporal scope, and cumulative actions for Alternative 1 applies here.

North American Marten - Determination

Feedground management at Alkali Creek would have only minor, negative effects on wolverine because (1) feeding operations of the Alkali Creek feedground does little *by itself* to constrain elk to low-elevations in the Gros Ventre watershed during the winter, (2) wolverines are expected to be rare in the watershed for the duration (15 years) of the proposed feedground permit, and (3) feedground operations would carry essentially no negative direct effects (mortality risk or disturbance effects) on wolverines. Feedground management at Alkali Creek would contribute little, if any, toward federal listing of this proposed species.

With respect to a determination made in the Biological Assessment prepared during Section 7 consultation with the U.S. Fish and Wildlife Service, the determination for the Proposed Action alternative would be "**will not jeopardize the continued existence of the species**".

Forest Service Region 4 Sensitive Species

This section discloses potential effects to Forest Service Sensitive Wildlife Species that were identified in the Affected Environment chapter as warranted for detailed analysis. Potential direct effects, indirect effects, and cumulative effects are described by species or groups of species, and by alternative. Analyses for some species were combined where effects were similar. Effects determinations for sensitive wildlife species are summarized in the table below.

Table 20: Effects Determinations for Forest Service Sensitive Wildlife Species Known or Suspected to Occur Within the Analysis Area

Species	Alternative 1- No Action	Alternative 2 – Proposed Action
Bighorn Sheep	MIIH	MIIH
Gray Wolf	NI	BI
Greater sage grouse	NI	MIIH
Bald Eagle	NI	NI

NI - No Impact;
MIIH - May Impact Individuals or Habitat, but Will Not Likely Contribute To a Trend Towards Federal Listing or Cause A Loss of Viability to the Population or Species;
BI - Beneficial Impact.

Effects Common to Both Alternatives

Elk make up a portion of the prey and carrion base for wolves and bald eagles on the Bridger-Teton National Forest. If a new disease (e.g. bovine tuberculosis, bovine paratuberculosis, or chronic wasting disease) becomes established, wolves and bald eagles could benefit from a short term (about 10 years) increase in vulnerable prey and carrion. In the long term, wolves and bald eagles could be negatively impacted due to a decrease in the numbers of elk. The risk of this effect does not vary by alternative because both the No Action alternative and the Proposed Action alternative assume continued winter elk management by the Wyoming Game and Fish Commission on federal and other managed lands. Wolves and bald eagles would not be directly affected by contracting paratuberculosis, brucellosis, or chronic wasting disease under either of the alternatives because they are not known to be susceptible to these diseases (Williams 2001; Thorne et al. 1982).

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action alternative)

Bighorn Sheep - Direct and Indirect Effects

Bighorn sheep numbers were used as an indicator of the effects of this alternative on the population trend and habitat conditions because this species is a **Harvest Management Indicator**, as well as a **Forest Service Sensitive Species.**

This alternative would carry no disturbance effects to bighorn sheep because feedground operations at Alkali Creek would not occur. The effects of travel and operations associated with Patrol Cabin and Fish Creek feedgrounds, including access to the upper Gros Ventre watershed from Atherton Campground (lower watershed) were considered below as cumulative actions.

An increase in the height and distribution of trees and shrubs would likely occur in the absence of winter elk management at the Alkali Creek feedground. This minor shift toward woody plants would decrease foraging opportunities for bighorn sheep (principally a grazer) at the feeding site and vicinity. Woody cover would also slightly increase risks of predation losses to stalking predators such as cougars. These effects would be strongest at and near (within a 750-meter perimeter; see Vegetation Resources section) the feedground but it would extend up the river corridor associated with elk movement to and from the other two feedgrounds. The 750-meter band would extend into crucial winter range, including an area on the north side of the Gros Ventre River (Gray Hills) commonly used by bighorn sheep.

Brucellosis may be transmitted to bighorn sheep (BHS) but they are most likely dead-end hosts (Davis 1990; Thorne 2001). Brucellosis is not expected to directly adversely impact populations of BHS (Thorne et al. 1982; Disease Expert Meeting 2002), and sheep are not expected to transmit the disease to other species or conspecifics. Although BHS are susceptible to brucellosis, elk to BHS transmission events are likely very rare (Kreeger et al. 2004). Some evidence suggests the BHS might not survive the disease (Kreeger et al. 2004) and therefore BHS to BHS transmission would be unlikely. Similarly, transmission of other diseases, including pasteurellosis, necrotic stomatitis, psoroptic scabies, lungworm, and viral microparasites are not expected to spread from elk to other ungulates in any alternative. BHS are not susceptible to chronic wasting disease.

Removing the facilities at Alkali Creek feedground would slightly increase chances that Forest Service managers would allow a wildfire to burn through the area and improve habitat conditions for bighorn sheep. However, the presence of ranch residences and winter sage grouse habitat and leks in and near the analysis area would still favor suppression decisions concerning wildfire.

The Jackson bighorn sheep management unit encompasses the corridor analysis area and includes all of the Gros Ventre watershed, the south portion of the Jackson Ranger District (Willow Creek watershed), and the southern portion of the Buffalo Ranger District to the north of Alkali Creek feedground. Its population objective is 500 individuals. Winter counts of bighorn sheep obtained using a helicopter ranged from 183 in 2006 to 417 in 2011, suggesting an increasing population (WGFD data; available at http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/JCR_BGJACKSON_BS_20110002891.pdf. Based on the 2011 count, the population was 9.2 percent below objective. A sharp increase in mortality related to disease occurred during winter 2012-2013, and likely decreased the population further (D. Brimeyer, WGFD, pers. comm.). However, given the mix of counterbalancing effects, selecting this alternative would not greatly reduce bighorn sheep and move numbers away from the herd unit objective.

Bighorn Sheep - Cumulative Effects

The corridor analysis area (Gros Ventre River corridor spanning the Forest Service boundary near Turpin Creek to Fish Creek feedground) was used to define the spatial extent of the cumulative effects of the No Action alternative on bighorn sheep. This area was biologically relevant because it encompassed the spatial extent of the reduction in elk herbivory that characterized this alternative and overlapped parts of crucial (winter) ranges of bighorn sheep.

Prescribed fires are an important source of human-caused improvement in bighorn sheep habitat. Eleven prescribed fires in the analysis area (30 years to present) totaled 4,518 acres. Portions of the prescribed fires occurred on crucial bighorn sheep ranges or in migration corridors. The habitat (fire) treatments were intended to improve forage availability for bighorn sheep and other wild ungulates by increasing grass and forb cover and decreasing the coverage of conifers. By decreasing obstructions at ground level, they also increase horizontal visibility, a benefit for sheep that are vigilant for predators such as wolves and cougars. No prescribed fires are foreseeable in the analysis area.

Motorized travel in the Gros Ventre watershed likely carries some negative (disturbance) effects for bighorn sheep, particularly winter snowmobile travel through this species' crucial winter range that is transected by the main Gros Ventre River Road. Five snowmobile tour operators use the main Gros Ventre Road (from Atherton Campground) to access the upper Gros Ventre watershed, the adjoining southern portion of the Buffalo Ranger District, and the Upper Green River area (details—see cumulative effects for wolverine, above). Individual sheep in the analysis area typically do not exhibit strong avoidance responses (at least visibly) to snowmobile users that are travelling on designated routes. Although many of the winter range sites used by bighorn sheep are distant (more than 300 meters) from the Gros Ventre Road, some individual sheep may use such habitats in response to snowmobile activity. Most summer and fall recreation in the analysis area occurs when bighorn sheep use high-elevation ranges in the Gros Ventre Wilderness, although some individuals continue to use habitats along roads during summer as well.

Use of the main Gros Ventre Road by feedground personnel is also a potential source of disturbance particularly in the lower portions of the analysis area. Feedground personnel travel from the trailhead near Lower Slide Lake to the Patrol Cabin (temporary residence) on snowmobile on a weekly basis to conduct feeding operations at Patrol Cabin and Fish Creek feedgrounds. Feeding operations at Patrol Cabin and Fish Creek feedgrounds do not occur near (more than 1.3 miles) crucial range for bighorn sheep.

Bighorn Sheep - Determination

Prescribed fires and travel management in the Gros Ventre watershed, the principal cumulative actions that influence bighorn sheep in the Analysis Area, contribute to different effects on bighorn sheep. The increase in woody species (e.g., aspen) in the absence of winter elk management, and travel management, are counterbalanced by the positive effect of the prescribed fires. The additional effect of the No Action alternative is too small in spatial scale affect the bighorn sheep population in the Analysis Unit and on the Bridger-Teton National Forest. Closure of the Alkali Creek feedground "**may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**".

Gray Wolf - Direct and Indirect Effects

No direct effects to wolves are anticipated from not issuing a special use permit because winter elk management would continue to occur on federal or other managed lands. Wolves would continue to be attracted to the concentration of elk at the feedgrounds. In this alternative, closure of the Alkali Creek feedground would eliminate this concentration of elk during winter, but likely trigger increased elk use of the feedground, Patrol Cabin feedground and Fish Creek feedground. Elk would make some round trips to the National Elk Refuge. Elk readily shift among the three feedgrounds in the Gros Ventre watershed due to predation pressure by wolves (Jimenez 2003). Although closure of Alkali Creek feedground would likely change the movement patterns of at least one wolf pack (Lower Gros Ventre and Pinnacle packs) during winter, this effect would be minor because the pack(s) would readily adapt to the changed condition by focusing activities at the other Gros Ventre feedgrounds. Some minor, positive effects on late spring, summer, and fall habitat (woody forage and cover) for elk, deer, moose—and a prey benefit for wolves—would likely result in and near the feedground following its closure.

Gray Wolf - Cumulative Effects

The 325,000-acre Gros Ventre Range Bear Analysis Unit is the spatial scale appropriate to define the boundaries of the cumulative effects analysis area for gray wolves. With some exceptions, boundaries for this unit are coincident with those of the Gros Ventre watershed. This collective area supports all or parts of at least six different wolf pack territories, and encompasses the significant sources of mortality risk for wolves in the Gros Ventre watershed. An important factor affecting gray wolves in the area is trophy and big game management by the state of Wyoming. Two, zero, and eight wolves were taken in the Crystal Creek, Rim, and Fish Creek gray wolf hunt areas (see map in Affected Environment) during the 2012 hunting season, respectively. In addition, two wolves were taken illegally in the Gros Ventre watershed in December, 2012. The 12 total wolves removed from these hunt areas was nearly equal to the

regulated, allowable harvest (11) established for these units by the Wyoming Game and Fish Commission for 2012.

A second factor in wolf mortality is the (lethal) removal of wolves that prey on livestock. There are about eight private ranches that variously support cattle or horses in the Gros Ventre watershed. Federal livestock allotments in the area are described in the cumulative effects section for grizzly bears. Livestock production on federal, state, and private lands increase mortality risks for individual gray wolves because individuals that prey on livestock are often removed during conflict management by the Wyoming Game and Fish Department and/or the Animal Plant and Health Inspection Service (previous management—USFWS, permitted livestock growers). Mortality risks for wolves are greatest on the south side of the Gros Ventre River and in the upper Green River where most cattle occur, as opposed to areas north of the Gros Ventre River where several cattle allotments were closed or converted to forage reserve status during the previous decade (no or intermittent use).

Fifteen total wolves in three different packs were removed during control actions since 1998, excluding up to 30 individuals removed from U.S. Forest Service allotments in the Upper Green River area (Jimenez et al. 2012; M. Jimenez, pers. comm.). During 2012, no wolves were removed from the Gros Ventre watershed in response to two documented losses of cattle in the Gros Ventre watershed. Currently, wolf removals in response to livestock depredation are not negatively affecting the long-term (more than 5 years) size of the wolf population in the analysis area (M. Jimenez, pers. comm., January 28, 2013).

At the time of wolf delisting in September 2012, the U.S. Fish and Wildlife Service concluded that Wyoming's wolf management plan (WGFC 2011, 2012) would maintain a recovered wolf population and would satisfy Wyoming's contribution to the Northern Rocky Mountain wolf population (USFWS 2012). This opinion anticipated wolf losses in the state due to both sport hunting and to control actions in response to predation on livestock.

Gray Wolf - Determination

Sport hunting and control of wolves (Wyoming State management) are major influences on wolf populations, that is, may reduce wolf numbers depending on population objectives and the frequency of predation on livestock. Thus, wolf numbers are not likely to soon increase within the cumulative effects analysis area. With respect to the direct and indirect effects of Alternative 1, some change in winter movement patterns of wolves would occur due to closure of the Alkali Creek feedground, but such effects would be insignificant because two other feedgrounds in the Gros Ventre watershed would, regardless, continue to operate. Elk would remain concentrated and readily accessible to wolves**.** Because the No Action alternative would not have negative effects above and beyond those identified for the cumulative actions, it would have "**no impact**" on gray wolves. This conclusion is appropriate in view of the U.S. Fish and Wildlife finding that current Wyoming State management is consistent with the sustained recovery of the species (see Affected Environment, Gray wolves)

Bald Eagle - Direct and Indirect Effects

This species is a **Forest Service Sensitive Species** and a **MIS**. The amount of disturbance associated with feedground operations was used as an indicator of the effects of this alternative on bald eagles. Human activity may disrupt eagle nesting and foraging activities, and at the extreme, cause nest abandonment.

Two bald eagle nests occur in the corridor analysis area: one along Lower Slide Lake approximately 200 yards from the main Gros Ventre Road, and one near Upper Slide Lake about 100 yards distant. The nest near Lower Slide Lake consistently produces offspring; nesting and breeding success at Upper Slide Lake is intermittent.

No disturbance to either nesting pairs would result from discontinuing operations at Alkali Creek feedground because no feeding operations and round trips past the nests on the main Gros Ventre Road (Patrol Cabin to Alkali Creek feedground and return) would occur.

A population objective of 29 nesting territories has been established for the upper Snake River-Teton region (Grand Teton National Park south to the Idaho border near Alpine, Wyoming) by the Greater Yellowstone Bald Eagle Working Group (email: *Bald Eagle Working Group Population Objectives for Grand Teton and Snake River* March 20 2013, project record). For 2012, 36 sites (territories) were occupied; 30 active nests fledged 28 young. Currently, this population is above objective—there were over 17 pairs in this area on private lands alone.

Numbers of nesting pairs appears to have stabilized in the major recovery areas of northwestern Wyoming. During 2011, Wyoming Game and Fish Department biologists identified 33 occupied territories of bald eagles in the Wyoming portion of the Greater Yellowstone Ecosystem, excluding Yellowstone Park and the Salt River area (southern Bridger-Teton; WGFD 2011). These nests produced 27 mature young, and not all nesting territories were checked for occupancy or offspring by biologists. Based on 2003 data, the bald eagle population in the Greater Yellowstone Ecosystem was similarly over objective (*Bald Eagle Working Group Population Objectives for Grand Teton and Snake River* March 20 2013).

The potential reproductive contribution of the Upper Slide Lake nest is small relative to the Bridger-Teton National Forest and the Yellowstone Ecosystem. The No Action alternative would have little or no positive effect on population size on the Bridger-Teton National Forest.

Bald Eagle - Cumulative Effects

The potential for cumulative effects to bald eagles for this alternative was considered within the corridor analysis area. This area was biologically relevant because it encompassed both bald eagle nests currently in the watershed and the human activities that most affect them.

The principal actions that affect bald eagles in the corridor analysis area are human disturbance associated with year-round recreation, feedground operations at Patrol Cabin and Fish Creek feedgrounds during the winter, and livestock grazing.

As discussed for wolverine, the Gros Ventre Road is used extensively by commercial outfitters to access the south portion of the Buffalo Ranger District and the upper Green River watershed via snowmobile. For both nests, this activity is unlikely to create a visual and auditory disturbance to the birds. At Lower Slide Lake, the road is likely too far (about 200 yards) from the nest for snowmobile activity to disrupt bald eagle nesting activities (S. Patla, Nongame Biologist, WGFD, pers. comm.). At Upper Slide Lake, the nest is not directly in view, and is situated vertically well above the road. Both pairs are conditioned to roadside noise. Intermittent nesting by bald eagles at Upper Slide Lake is related to a mix of different factors, including the duration of lake ice in the pre-nesting (February–March) season (S. Patla, Nongame Biologist, WGFD, pers. comm.).

Feedground personnel also use the lower Gros Ventre Road to make 1-2 trips per week on snowmobiles from the trailhead at Atherton campground to access the Patrol Cabin and Fish Creek feedgrounds and their temporary residence. This is a potential, but unlikely, additive disturbance to breeding and nesting activities of the eagles for the reasons provided above.

Spring and summer recreation in the upper portion of the Gros Ventre watershed dramatically increases when the gate on the main Gros Ventre road at Atherton campground opens in spring. This is also an important source of disturbance for the nesting pairs and for non-breeding birds that use the analysis area. Spring recreation includes off-trail hiking by antler hunters that may disturb nesting pairs.

Cattle grazing on Forest Service cattle allotments and on private lands may negatively affect the abundance and distribution of small mammals such as voles and ground squirrels by reducing vegetative cover, density, and vertical structure. For bald eagles, small mammals serve as an alternate prey to fish. In the analysis area, intensive grazing is largely limited to riparian zones, wet meadows, and along roads or major trails used by cattle during the summer or early fall. Nearly all allotments occur on the south side of the Gros Ventre River. Cattle and horse grazing also occurs on numerous ranches located along the main Gros Ventre Road. Carrion from cattle in the analysis area provides an occasional food source of bald eagles as well. Analogous to the effects of livestock grazing, concentrated elk herbivory at Patrol Cabin and Fish Creek feedgrounds may affect herbaceous and woody cover needed by bald eagle prey such as amphibians.

Bald Eagle - Determination

The threshold for evaluating the direct, indirect, and cumulative effects of this alternative was no (zero) human-caused disturbance to the nesting pairs in the analysis area, the condition that best supports their reproductive success. Discontinuing feedground operations at Alkali Creek would eliminate all potential disturbances along the main Gros Ventre Road stemming from daily travel from Patrol Cabin to Alkali Creek, although no such effects are expected. Thus, the No Action alternative would not add negative effects above and beyond those expected from the cumulative actions and would have "**no effect**" on bald eagles in the analysis area.

Greater Sage-Grouse - Direct and Indirect Effects

The amount and condition of sagebrush habitat was used as an indicator to evaluate the effects of the Alternative 1 on sage-grouse. Few or no disturbance effects on sage-grouse from feeding operations are expected from implementing this alternative because operations would not occur at Alkali Creek feedground, save for removing some existing facilities over a short time during the summer. Currently, sage grouse do not use the Alkali Creek feedground site or area (less than 750-meter radius) for breeding (leks), nesting, or brood rearing. The physical condition and coverage of sagebrush stands and herbaceous (grass, forb, and sedge) cover at and near the Alkali Creek feedground in would improve over time. Although largely local in scale, these improvements would improve sage grouse nesting and brood rearing habitats.

Greater Sage-Grouse - Cumulative Effects

The corridor analysis area was used to define the spatial scale of the analysis because this area encompassed nearly all of the elk herbivory and trailing effects associated with this alternative.

The principal cumulative actions that affect sage-grouse in the analysis area are prescribed fires, livestock grazing, feedground management at Patrol Cabin and Fish Creek, and recreation. Eleven prescribed fires totaling 4,518 occurred in the analysis area. At intensively grazed sites (e.g., along system trails and roads in the analysis area), livestock grazing has reduced the coverage of mature sagebrush (trampling) and herbaceous cover in sagebrush communities, important components of winter, nesting, and brood rearing habitat for sage-grouse. Analogous to the direct and indirect effects of elk herbivory at Alkali Creek feedground, feedground management at Patrol Cabin and Fish Creek feedgrounds has also trampled and reduced sagebrush cover.

Most off-trail snowmobile activity in the analysis area, including Alkali Creek feedground and vicinity, is restricted and regulations are typically observed. However, winter snowmobiling has potential disturbance effects on wintering sage-grouse north of Patrol Cabin feedground and the adjacent lower portions the Cottonwood and Fish Creek watersheds because portions of these areas are open to off-trail travel. Here, authorized (and unauthorized—closed areas) off-trail travel by snowmobile users occurs (less than 10 times) during the winter. These activities may disrupt birds that use the heavy sagebrush as thermal cover and protection from raptors. Due to poor snow conditions, snowmobile activity declines by late March when sage-grouse congregate at the main and satellite lek north of the Patrol Cabin feedground.

Concentrated elk herbivory at Patrol Cabin and Fish Creek feedgrounds during the winter have effects analogous to those described in direct and indirect effects for Alkali Creek feedground.

During late spring, summer, and fall, recreational activity within the analysis area occurs principally along the main Gros Ventre Road as motorized use of roads, dispersed camping, big game hunting, and antler hunting. All these activities potentially disrupt nesting (spring) and brood rearing of sage-grouse. All these effects are expected to continue in the future.

Greater Sage-Grouse - Determination

The primary effect of Alternative 1 on sage-grouse is improvement of sagebrush communities at and near the Alkali Creek feedground. This would locally improve habitat conditions for sage-grouse nesting and brood rearing activities. This positive effect is counterbalanced by both the larger, negative effects of cattle grazing, feedground management at Patrol Cabin and Fish Creek feedgrounds, and prescribed fires that reduce the coverage and quality of sagebrush habitat at a larger spatial scale. This positive is also counterbalanced by the negative effect of human disturbance. In view of the cumulative actions the addition of the No Action alternative does little to favorably balance the total effects away from listing. Thus, the No Action alternative would have "**no impact**" on greater sage-grouse at the National Forest Scale.

Peregrine Falcon, Great Gray Owl, Boreal Owl, and Northern Goshawk - Direct and Indirect Effects

Eliminating feedground management at Alkali Creek would locally improve foraging conditions for these four raptors. Herbaceous (grass, forb and sedge), mountain shrub, and tree cover would improve around the Alkali Creek feedground, its vicinity (within an approximate one-mile radius of the feeding site), and between Alkali Creek and Patrol Cabin feedground. This increase in vegetation cover and structure would improve habitat conditions for most raptor prey including: snowshoe hares and red squirrels (goshawk, boreal owls) that use conifer and deciduous forests near the feeding site; meadow voles (great gray owls) that use open meadows; and passerine

birds such as western meadowlarks, red-winged blackbirds, and willow flycatchers (peregrine falcon and goshawks) that use riparian, wetland, and moist upland communities (review in Fleischner 1994).

Alternative 1 would carry very minor or no direct mortality risks or disturbance effects on goshawks or peregrine falcons because these species are not present during the period of winter feedground operations. Great gray owls may use the openings and adjacent forests in the feedground area for foraging during the winter. Elimination of feedground management thus might reduce human disturbance that potentially disturbs vital activities (primarily feeding) of great gray owls. The No Action alternative would carry few or no disturbance effects on boreal owls because, regardless of feedground operations, this species prefers mature and old growth spruce-fir forests for nesting. Removal of feedground facilities such as the barn and corral and use of the access during the summer might cause minor disturbances to great gray owls and peregrine falcons.

Peregrine Falcon (Forest Service Sensitive Species and MIS): The Wyoming statewide goal for the peregrine falcon is 30 occupied nesting territories (Wyoming Game and Fish Department 2011). In 2011, state and federal biologists surveyed 24 randomly selected nesting territories; 21 were classified as occupied and 33 of these fledged young. An additional 15 (non-random) nesting territories were also surveyed. The statewide total was 39 territories, 33 of which were occupied by breeding adults. These 33 pairs produced 50 young. More than 908 nesting attempts at 93 territories have occurred statewide since 1984, resulting in more than or equal to 1,387 young (WGFD 2011). Based on these data, Wyoming remains well above recovery goals.

Because this alternative contributes positively to vegetation conditions that support peregrine falcon prey, it enhances the breeding success of the nesting pair near Lower Slide Lake (see Affected Environment) and contributes to the continued recovery of the species at the scale of the Bridger-Teton National Forest and Wyoming. This effect is minor however, because only one nesting pair occurs in the analysis area and contributes to the statewide population. In addition, the area of vegetation positively affected by relief from elk herbivory and trailing (less than 750 meters from the feedground) is small compared to the total foraging area (analysis area plus additional riparian habitats to the west) available to the pair.

Peregrine Falcon, Great Gray Owl, Boreal Owl, and Northern Goshawk - Cumulative Effects

The corridor analysis area was chosen to define the boundaries for the cumulative effects analysis for the raptors above. This area is large enough to encompass some or all of the home range of the only known peregrine nest in area (Lower Slide); and numerous potential home ranges of goshawks and great gray owls.

The principal cumulative actions that potentially affect these raptors are prescribed fires, human recreation, livestock grazing, and feedground management at Patrol Cabin and Fish Creek feedgrounds. Because the prescribed fires typically burned at low or moderate intensity (cool spring or fall burns), they improved habitat conditions for many raptor prey (e.g., meadow voles and willow flycatchers) by decreasing conifer cover at forest edges; improving the coverage of aspen, willows, and open meadows; and locally increasing habitat diversity. These treatments also provided some forest openings used by boreal owls for foraging. The three wildfires (total 1,349 acres) that also occurred in the analysis area likely had similar effects where fires burned at low or moderate intensity.

Guided snowmobile tours commonly occur from December to March along the main Gros Ventre Road, with trips extending into the Upper Green River watershed located to the east and into the Buffalo Ranger District to the north. There are 24 miles of road and trail available to snowmobile-use during the winter. The trips potentially disturb great gray owls during the winter.

Summer recreation activities such as camping, fishing, and horse-back riding are largely concentrated along the main Gros Ventre Road from early May to late summer and big game hunting occurs throughout the watershed during fall months. These activities also potentially cause disturbance including to the nesting peregrine falcon pair located in the lower portion of the watershed (Lower Slide Lake; less than 200 yards from the Gros Ventre Road) that may forage in the vicinity of Alkali Creek. These activities have little effect on boreal owls that use the dense conifer forests that are avoided by people.

Livestock grazing in the Gros Ventre watershed negatively affects the abundance and distribution of raptor prey by reducing vegetative cover, density, and vertical structure, particularly in riparian zones and open meadows that are close to system trails, water sources, and roads. Concentrated elk herbivory at Patrol Cabin and Fish Creek feedgrounds during the winter would have effects analogous to those described in direct and indirect effects for Alkali Creek feedground.

Peregrine Falcon, Great Gray Owl, Boreal Owl, and Northern Goshawk - Determination

The direct and indirect effects of Alternative 1 would be mildly "**beneficial**" for great gray owls, goshawks, boreal owls, and peregrine falcons in the analysis area and for the Bridger-Teton National Forest. In the absence of feedground management, habitat conditions for raptor prey, particularly for riparian zones and meadows, would improve at and near the feedground site and would contribute to the positive effects of prescribed fires in the watershed. Human disturbance (mostly recreation), livestock grazing, and management of other feedgrounds contribute negatively to the cumulative effects. The No Action alternative would not add negative effects above and beyond those expected from the cumulative actions alone.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Bighorn Sheep - Direct and Indirect Effects

Bighorn sheep numbers were used as an indicator of the effects of this alternative on the population trend and habitat conditions because this species is a **Harvest Management Indicator**, as well as a **Forest Service Sensitive Species.**

This alternative would carry minor disturbance effects associated with the use of the main Gros Ventre Road. In this case, feedground personnel would also use the spur from the main road to the feedground site, and make daily round trips between Patrol Cabin and Alkali Creek feedgrounds. Apparently preferring to use foraging sites on the opposite (north) side of the river for foraging, bighorn sheep seldom occur along the main Gros Ventre Road or the spur during the winter. Bighorn sheep might use the south side of the river more frequently in the absence of human disturbance, but regardless, most disturbances originates from multiple, daily snowmobile tours that occur along the Gros Ventre Road (see cumulative actions described below). Thus,

only a minor (if any) increase in disturbance effects on bighorn sheep are expected for the Proposed Action alternative over and above those for the No Action alternative.

Concentrated elk herbivory results in a decrease in the height and density of shrubs and trees in the feedground area, and an increase in the coverage of grasses and forbs (see Vegetation section). This shift would improve foraging for bighorn sheep. The reduction in woody cover would also decrease risks of predation losses to stalking predators such as cougars. The effects would be strongest within 750 meters of the feedground site and include some crucial (winter) range of bighorn sheep (WGFD 2011a).

Bighorn Sheep - Cumulative Effects

The same cumulative effects analysis area, temporal scope, and indicator and list of cumulative actions were used as for the No Action alternative.

Population conditions for the Jackson bighorn sheep herd are described in the bighorn sheep section for the No Action alternative. Although increasing from 2001 to 2011, this population may have recently declined (2013) during winter due to disease factors. The minor effect of the Alternative 2 is mixed with cumulative actions that carry both positive and negative effects. Although it carries positive effects, selecting this alternative would likely not increase the population upward toward its objective of 500 individuals.

Bighorn Sheep - Determination

Alternative 2 would likely improve foraging conditions and predator detection by bighorn sheep at and near the Alkali Creek feedground, and this positive effect would occur in addition to the larger positive effect of past prescribed burns. Disturbance associated with motorized travel by feedground personnel near bighorn sheep crucial winter range is a minor negative factor because snowmobile tours carry the majority of any (uncertain) disturbance effects. Thus, the effect of Alternative 2 and prescribed fires counterbalance a minor disturbance effect. As a result, the proposed action does not tip the scale toward listing at the National Forest scale. The actions in this alternative "**may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**".

Gray Wolf - Direct and Indirect Effects

The additional concentration of elk at a third feedground (in addition to the Patrol Cabin and Fish Creek feedgrounds) in the Gros Ventre watershed would provide wolves a third predictable location to find prey, and would assist WGFD's effort in keeping elk from moving to the National Elk Refuge in response to wolf predation. Human disturbance associated with feedground operations would be negligible because wolf packs in the area are already well conditioned to two other feedground operations and recreational (snowmobile) traffic in the watershed.

Elk are an important prey and carrion source for gray wolves in the Gros Ventre watershed (Jimenez 2003). Elk attracted to the Alkali Creek feedground are beneficial to wolves because they provide a consistent and predicable source of winter food. The presence of the Alkali Creek feedground would further stabilize the distribution of their prey, and keep elk from traveling to the National Elk Refuge where they would be less available to wolf packs in the middle and upper Gros Ventre watershed.

To the extent that it contributes to the establishment and continuance of new mortality agents such as chronic wasting disease, winter management at Alkali Creek feedground would likely carry short-term benefits *to wolves* by increasing prey vulnerability. However, the effect of chronic wasting disease on population dynamics of elk is unknown (Williams et al. 2002). Models developed for mule deer that did not include predation effects suggest a decrease in this prey's density and population stability following the introduction of chronic wasting disease (Gross and Miller 2001). Elk populations modeled by Hobbs (2006) did not decline over the long-term in either the presence or absence of selective predation by wolves. Selective predation by wolves potentially has a strong effect and interaction with the prevalence and persistence of chronic wasting disease (Hobbs 2006; Wild et al. 2001). Aspects of wildlife disease in the context of elk and elk feedgrounds in Western Wyoming were discussed in detail in the 2008 FEIS and in a supplemental (SEIS) specialist report regarding wildlife diseases (J. Henningson; project record).

Gray Wolf - Cumulative Effects

The same spatial extent and temporal scope was used to define the cumulative effects analysis area as was used for the No Action alternative. The cumulative actions described for gray wolves under Alternative 1 apply here as well.

Gray Wolf - Determination

Trophy game management and control (wolf mortality) actions by the Wyoming Game and Fish Department in response to livestock losses currently cause significant mortality of wolves in the Gros Ventre watershed, and are the major contributors to the effects of this alternative. However, the U.S. Fish and Wildlife Service has concluded that the Wyoming wolf management plan, which addresses sport hunting and livestock-related losses, would maintain a recovered wolf population in Wyoming, and that the Northern Rocky Mountain wolf population would remain viable if recovery targets are met (USFWS 2012). Given this opinion by the Service, the wolf population on the Bridger-Teton National Forest, as currently managed by the state of Wyoming, is also likely to remain viable in its context with the larger population in the Northern Rocky Mountains. Feedground operations at Alkali Creek would further improve the presence and predictability of wintering elk among feedgrounds in the Gros Ventre watershed over just two feedgrounds. The introduction of new wildlife diseases would also carry only a mix of short-term (mostly beneficial) and long-term (positive or negative) effects on wolves. In view of the positive effect of the feedground on the number and predictability of elk prey, this alternative would have a "**beneficial**" effect on gray wolves.

Greater-Sage-Grouse - Direct and Indirect Effects

No direct effects on greater sage-grouse are expected from continuing elk feeding at Alkali Creek feedground because, although the Alkali Creek feedground supports sagebrush communities, it does not provide a lek site, wintering habitat, or brood rearing habitat. Some disturbance to wintering sage grouse could occur associated with round-trip travel of feedground personnel from Patrol Cabin to Alkali Creek feedground, but this disturbance would be limited to the roadside and thus minor. Feedground operations at Alkali Creek feedground would have little temporal overlap with the sage-grouse breeding season that begins in late March.

Sagebrush stands and herbaceous cover available to sage grouse at and near the Alkali Creek feedground would continue to be negatively affected by elk herbivory and trampling in this

alternative. This effect would reduce the potential for the area to provide habitat for sage grouse in the future. However, this potential would become increasingly mild with increasing distance from the feedground. See the Brewer's Sparrow section for further analysis on impacts to sagebrush.

Greater Sage-Grouse - Cumulative Effects

The cumulative effects analysis area, temporal scope, and cumulative actions are the same as described for the No Action alternative.

Greater Sage-Grouse - Determination

Although the cumulative actions **(**livestock grazing, recreational activity, and past prescribed fires) carry negative effects on sage-grouse, Alternative 2 would have no effects other than a negative effect on sagebrush habitat in areas that are potentially occupied by sage-grouse. This potential effect would only occur at and near the Alkali Creek feedground. Thus, Alternative 2 would carry little or no negative effects over and beyond those identified for the cumulative actions. This alternative "**may impact individuals or habitat but not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**".

Bald Eagle - Direct and Indirect Effects

This species is a **Forest Service Sensitive Species** and a **MIS**. The same indicator (human disturbance) was used as in the No Action alternative. In the Proposed Action alternative, daily round trips from Patrol Cabin to Alkali Creek by feedground personnel using snowmobiles or a horse-drawn sleigh would occur daily in addition to the existing weekly snowmobile trips from the snowmobile trailhead at Atherton campground to access Patrol Cabin feedground (a cumulative action considered below). The additional trips would not increase disturbance to the nesting pair near Upper Slide Lake because (1) the road is not visible from the nest, (2) the nest is located at a vertical height greater than 40 feet above the road, and the nesting pair is already conditioned to existing winter and summer vehicle traffic. The proposed action does not increase disturbance to the nesting pair at Lower Slide Lake because trips to access Patrol Cabin from Atherton Campground would not be more frequent in this alternative.

The nesting pair at Lower Slide Lake may experience a local increase in elk carrion availability associated with feedground operations at Alkali Creek because elk numbers would increase in the area. On the other hand, reductions in herbaceous and woody cover associated with continuing feedground operations at Alkali Creek feedground would reduce the abundance of small mammals available as prey during the summer.

Bald Eagle - Cumulative Effects

The same spatial extent, temporal scope, and indicator were used as were identified for the No Action alternative. Cumulative actions were described in the cumulative effects section for the No Action alternative.

Population objectives for the bald eagle were described under the No Action alternative. Based on the discussion provided in the determination above, implementing the No Action alternative would have no effect on eagle numbers on the Bridger-Teton National Forest and would not detract from sustained recovery.

Bald Eagle - Determination

The cumulative actions identified for this alternative have mixed favorable and negative effects on bald eagles. Because Alternative 2 does not increase disturbance effects to bald eagles and has only minor other effects, it would not reduce reproductive success of the species in the analysis area and on the Bridger-Teton National Forest. Alternative 2 would have "**no impact**" on bald eagles.

Great Gray Owl, Goshawk, Boreal Owl, and Peregrine Falcon - Direct and Indirect Effects

Implementing this alternative would degrade foraging conditions for great gray owls, goshawks, and peregrine falcons at the feedground site and vicinity. These effects would be opposite to those described for the No Action alternative. In this case, elk herbivory would reduce the coverage and density of residual herbaceous vegetation (growth from the previous summer) in meadows and wetlands, as well as the coverage, height, and structure of woody species needed by common raptor prey. The effects of winter elk herbivory on boreal owls would be very minor because elk do not use the conifer and aspen forests immediately south (up slope) of the feedground due to deep snow and dense vegetation.

Many effects of elk herbivory at and near the feedground would be similar to the effects of cattle and sheep grazing studied in North America and elsewhere. Although some bird species of riparian woodlands and shrub steppe respond favorably to livestock grazing, many more are negatively affected (Finch et al. 1992). Sedge cover, forb cover, and foliage height diversity of herbs increases rapidly (less than 5 years) with relief from grazing in Nevada, improving avian species richness and relative abundance of birds, particularly species associated with wetlands and riparian areas (Dobkin et al. 1998). Rodent abundance declines 69 percent on a grazed (livestock; rest rotation), mesic grassland versus ungrazed areas at a coastal site in California; raptor use declines by 15 percent (Johnson and Horn 2008). Conventional livestock grazing pressure negatively affects the abundance of field voles in upland habitats in the British uplands within one year following experimental treatment (Evans et al. 2006). Moderate livestock grazing (40–60 percent use) may improve numbers of pocket gophers—an important great gray owl prey—due to a drying effect on wet meadows (Powers and Rich 2011), but it also may reduce the abundance of pocket gophers where it greatly reduces forb biomass and increases soil compaction (discussion and references in Keinath and Beauvais 2006).

This alternative would carry only minor disturbance effects and risk of mortality on raptors. Peregrine falcons and goshawks are not present during most feedground operations. Boreal owls would not be affected because they prefer mature and old growth forests to open sites such as the feedground. Some disturbances could occur to great gray owls that forage in the vicinity of the feedground and along travel routes used by feedground personnel.

Great Gray Owl, Goshawk, Boreal Owl, and Peregrine Falcon - Cumulative Effects

For Alternative 2, the same spatial and temporal scope, and the cumulative actions were used that were identified for the Alternative 1.

The Wyoming peregrine falcon population remains well above recovery. Population goals and performance for this species in Wyoming are described under the Alternative 1 and in WGFD 2011. Because this alternative indirectly (through effects of concentrated elk herbivory) reduces

available prey at and near the feedground, it may negatively affect the nesting success of the pair at Lower Slide Lake. Thus, this alternative contributes negatively, but in a minor way, to the current stability of the peregrine falcon population in the analysis area, the Bridger-Teton National Forest, and the state of Wyoming.

Great Gray Owl, Goshawk, Boreal Owl, and Peregrine Falcon - Determination

Concentrated elk herbivory would negatively affect raptor prey on a local scale (primarily the feedground site and within less than 750 meters) and would combine negatively with the cumulative actions described above. The effect of Alternative 2 would not occur at a spatial scale sufficient to tip the balance of effects toward listing on the analysis area or the Bridger-Teton National Forest. For great gray owls, goshawks, boreal owls, and peregrine falcons the Proposed Action alternative "**may impact individuals or habitat but not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**".

Neotropical Migratory Birds

Alternative 1 - Effects of Not Issuing a Special Use Authorization (No Action Alternative)

Direct and Indirect Effects

The quality and quantity of the habitat was used as indicators to evaluate the effects of Alternative 1 on migratory birds. No disturbance to migratory birds would result from eliminating feeding operations at Alkali Creek feedground, except for insignificant effects associated with using access roads and the feedground site when facilities are removed during the summer.

Typical habitats used by migratory birds and the effects of the No Action and Proposed Action alternatives are summarized in Table 21. Effects on bald eagles, peregrine falcons, yellow-billed cuckoos, flammulated owls, and Brewer's sparrow were already considered in the sections on Forest Service Sensitive Species or MIS.

Alternative 1 would carry either positive or no effects on migratory birds. Positive effects to species such as Swainson's hawk, willow flycatcher, and loggerhead shrike stem from improving over-winter retention of herbaceous cover or relieving woody species such as willow or sagebrush from heavy browsing or trampling near the feedground. Lewis's woodpecker and olive-side flycatchers would benefit from an increase in aspen snags that would occur after the coverage and age of aspen increased. However, more than 15 years (the duration of the proposed permit) might be required for existing trees to grow a large size, die, and become available as snags.

Cumulative Effects

The corridor analysis area was used to define the spatial extent of the cumulative effects analysis area because it was large enough to encompass at least one home range for individuals of all the species.

The principal human-related actions in the analysis area that affect migratory birds are livestock grazing, prescribed fires, and human disturbance. Their effects are described in the cumulative effects section for sage grouse (above).

Determination

Determinations regarding the effects of Alternative 1 are summarized in Table 21. For all the species considered there, this alternative would have no effects or minor positive effects on migratory bird populations at the scale of the analysis area and the Bridger-Teton National Forest. Positive determinations resulted principally from recovery of vegetation near the feedground.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Direct and Indirect Effects

No direct effects to migratory birds are expected from implementing Alternative 2 because feeding operations would not temporally overlap vital activities of migratory birds such as breeding and nesting.

Willow, aspen, mountain shrub, and sagebrush communities around the feedground site (within a 750-meter radius) would continue to incur heavy browsing or trampling by elk, reducing their coverage, vigor, physical structure, and height (see Vegetation Resources section). These vegetation attributes are important to migratory birds. Elk browsing would reduce willows to less than two meters in height (Anderson 2007). Habitat quality and quality for species such as Swainson's hawks and willow fly-catchers would decline. Browsing by elk would reduce escapement of aspen to older classes that could provide snags for nesting by Lewis's woodpeckers, Williamson's sapsuckers, and olive-side flycatchers. The open meadow retained through herbivory and trampling at the feedground site could improve habitat for long-billed curlew, an infrequent breeder in the analysis area.

Cumulative Effects

The same indicators (habitat quality and quantity) were used as for Alternative 1, and the spatial and temporal scope was similarly defined. The principal human-related effects on migratory birds were also the same as in the No Action alternative.

Determination

Determinations regarding the effects of Alternative 2 are summarized in the table below. For all the species considered, this alternative would have minor negative or no effects on habitats and populations at the scale of the analysis area and the Bridger-Teton National Forest.

Table 21: Habitats and Effects of the No Action and Proposed Action Alternatives on Migratory Birds

Species	Habitat	Habitat-related effects of No Action & Determination	Habitat-related effects of the Proposed Action & Determination
Swainson's hawk	Grasslands and shrublands	By increasing over-winter retention of herbaceous cover and woody vegetation within 750 meters of the feedground, improves habitat for small mammal prey. Determination: **Beneficial**. Regardless, few Swanson's hawks use the area. No effect on populations at the analysis area and National Forest scale.	Reduces over-winter retention of herbaceous cover and increases woody vegetation, thus reducing habitat quality for small mammals. Determination: **negative, local effect on habitat**. No effect on populations at the analysis area and National Forest scale
Long-billed curlew	Short-grass prairies, agricultural areas, moist meadows and pastures	Infill open areas near the feedground with woody vegetation. Determination: **No effect**—habitat in the analysis area is naturally limited and breeding is not expected. No effect on populations at the analysis area and National Forest scale.	Locally retain moist meadows and pasture. Determination: **No effect**—habitat in the analysis area is naturally limited and breeding is not expected. No effect on populations at the analysis area and National Forest scale.
Calliope hummingbird	Habitat generalist	Increases habitat diversity within 750 meters of the feedground. Determination: **Beneficial**— locally increases flowering plants by improving habitat diversity. Minor positive effect on populations at the analysis area and National Forest scale.	Locally decreases increases flowering plants. **Minor negative effect** on populations at the analysis area and National Forest scale.
Lewis's Woodpecker (LP) & Williamson's sapsucker (WS) & Olive-sided flycatcher	LP: Open conifer, aspen, or cottonwood woodlands WS: Coniferous or aspen forests	Long-term improvement in availability of aspen snags for nesting. Williamson's sapsuckers are uncommon in the analysis area. Determination: **No effect**—young aspen would not recruit as large trees and snags	Long-term reduction in aspen snags available for nesting. Determination: **Negative**—continued loss of large aspen in the feedground area. Minor negative effect on populations at the analysis area and National Forest scale.

Species	Habitat	Habitat-related effects of No Action & Determination	Habitat-related effects of the Proposed Action & Determination
(OF)	OF: Coniferous and deciduous forest edges and burned areas	within the duration of the permit. No effect on populations at the analysis area and National Forest scale.	
Willow flycatcher	Riparian shrubland	Local improvement in coverage and condition of willow habitat. Determination: **Beneficial**— contributes positively to local populations. Minor positive effect on populations at the analysis area and National Forest scale.	Reduction in habitat. Determination: **Negative effect on population around the feedground.** Minor negative effect on populations at the analysis area and National Forest scale.
Loggerhead shrike & Sage thrasher	Analysis Area: mature sagebrush. Mature sagebrush	Local increase in sagebrush cover due to relief from physical damage. Determination: **Beneficial**— Improvement in foraging habitat near the feedground. Minor positive effect on populations at the analysis area and National Forest scale.	Reduction in habitat quality (stature and vigor of sagebrush). Determination: **Negative effect** around the feedground. Minor negative effect on populations at the analysis area and National Forest scale.
Cassin's finch	Mature forest	Determination: **No effect**—elk herbivory has no effect on mature forests and finch populations at the analysis area and National Forest scale.	Determination: **No effect**—elk herbivory has no effect on mature forests and finch populations at the analysis area and National Forest scale.

Consistency of Alternative 2 with the Forest Plan Standard for the Pronghorn Migration Corridor

The *Pronghorn Migration Forest Plan Amendment* (USFS 2008) protects the migration of pronghorn in the zone from winter range near Pinedale, Wyoming to summer range in Grand Teton National Park, Wyoming. As much of the corridor is on the Bridger-Teton National Forest, the amendment requires that future Forest Service activities not interfere with pronghorn migration.

The Alkali Creek feedground, including the area of influence by foraging elk defined by a 750 meter perimeter (WGFD 2011a), is well within the pronghorn migration corridor. There is strong spatial overlap between radio-collared or casually-observed pronghorn and the Alkali Creek feedground area during the fall and spring migrations (S. Dewey, unpublished map data, Grand Teton National Park, project record; C. Schneebeck, unpublished map data, Nature Mapping Jackson Hole, project record). Winter feedground management reduces woody vegetation and increases the coverage of grasses and forbs. This effect is largely positive for pronghorn, a species with defenses that are vision based and that typically avoids forests, including small stands of aspen and mountain shrubs that are expected in the absence winter elk management.

Under the proposed action, the Alkali Creek feedground would also support a large haystack with two hay sheds, corrals, a tack shed, and elk trap, and water facilities. These developments, collectively covering about one acre, would require migrating pronghorn to circumvent these structures when passing through the area. Although pronghorn use the south side of the Gros Ventre River for migration and as residents during the summer, this effect would be minor because the feedground does not occur in a topographic bottleneck (constriction) of the migration corridor. Moreover, pronghorn encounter and routinely and successfully by-pass many anthropogenic features such as fences, highways, and housing developments during the course of their long migration to and from Pinedale.

Alkali Creek feedground operations occur from late December (earliest onset) to mid-April (latest end date; WGFD 2011b). Thirty-four pronghorn radio-collared in 1998 completed easterly (fall) migration before early January and the westerly (spring) migration during May (Sawyer and Lindsay 2000). Based on radio location data collected on radio-collared pronghorn (10 migrations by 8 pronghorn) from 2010−2011, the fall migration occurred from mid-September or mid-October to mid-November and the spring migration from late April or May to early June (Beckman et al. 2011). From 2009 to 2011 the earliest observations of westward-migrating pronghorn in the Gros Ventre watershed was May 26 (Nature Mapping Jackson Hole unpublished volunteer (spreadsheet) data, project record). These data indicate there would be little or no temporal overlap between pronghorn migration and feedground operations.

Based on the negligible effect of the facilities, elk foraging, and human-caused disturbance, winter management of elk at the Alkali Creek feedground would not interfere with successful pronghorn migration.

Cultural Resources

A Class III cultural resource survey was conducted at Alkali Creek feedground and a report detailing the results of this survey has been submitted to the Wyoming State Historic Preservation Office. No historic properties were identified at the feedground.

Wilderness and Wild and Scenic Rivers

Issues to be Addressed

Issue #2. Use of Alkali Creek feedground concentrates the elk, which could result in impacts to vegetation from browsing and trampling causing changes in vegetation type and condition, especially in sagebrush, aspen, and willow stands associated with riparian/wetlands. These vegetation impacts could affect wilderness character in the Gros Ventre Wilderness, outstandingly remarkable values (ORVs) in the Gros Ventre Wild and Scenic River Corridor, [and/or pronghorn migration]. Pronghorn migration is analyzed in the Wildlife Resources section. Alternatives are compared in this analysis by a narrative describing the expected vegetation changes and by a comparison of acres affected by alternative.

AFFECTED ENVIRONMENT

On October 30, 1984, Congress passed the *Wyoming Wilderness Act* (PL 98-550). The purpose of this Act was to "designate certain National Forest System lands for inclusion in the National Wilderness Preservation System in order to preserve the wilderness character of the land and to protect watersheds and wildlife habitat, preserve scenic and historic resources, and promote scientific research, primitive recreation, solitude, physical and mental challenge, and inspiration for the benefit of all of the American people". Passage of this Act designated the Gros Ventre Wilderness, which is immediately adjacent to the Alkali Creek feedground.

In May 1994, the Regional Forester certified the legal boundary description and map for the Gros Ventre Wilderness. Based on the topographic boundary map, two locations near the feedground were posted in 2003 and direct feeding of elk occurred outside of this boundary. However, as part of the 2007-2008 environmental review process for WGFC use of six feedgrounds located on the Bridger-Teton National Forest, it became apparent that more definitive boundary posting of the Wilderness was needed. Using the legal boundary description, a professional survey was completed and numerous posts were installed to mark the Wilderness boundary. Based on the new survey, feeding of elk had occurred within the Wilderness and the WGFD adjusted their operations to ensure that feeding would no longer occur within the Wilderness. The feedground permit area was reduced by 14 acres so that none of the current feedground permit area was located within the Wilderness however approximately 3,000 feet of the feedground boundary is concurrent with the Wilderness boundary. Figure 18 displays a vicinity map of Alkali Creek feedground with the Wilderness boundary identified.

Figure 18: Feedground Location Relative to the Gros Ventre Wilderness Boundary

For Wilderness, Section 4(b) of the *1964 Wilderness Act* provides the primary management direction stating that "… each agency administering any area designated as wilderness shall be responsible for *preserving the wilderness character* of the area" (emphasis added). The definition of Wilderness in the *Wilderness Act* reveals five inter-related qualities that together, serve to approximate wilderness character. Per the definition, Wilderness is a place that is, (1) natural, (2) untrammeled, (3) undeveloped, (4) provides outstanding opportunities for solitude or a primitive and unconfined type of recreation, and (5) may contain other features of value (Landres et al. 2012). Wilderness character is a holistic assessment that is determined at the scale of an entire Wilderness; it is not evaluated acre by acre (Landres et al. 2008).

Monitoring and management records for the Gros Ventre Mountains date back to 1978 with more comprehensive information available since 1984 when the area was designated as Wilderness. A comprehensive analysis of available data to assess wilderness character is scheduled to be completed within the next several years, however preliminary trend information suggests that wilderness character has improved since 1984 notably for the natural and untrammeled qualities. Improvement in the natural quality has primarily come from a 16 percent reduction in animal use months of cattle grazing since 1984 and expansion of native ungulates such as bison and predators including wolves and grizzly bears. The improvement in the natural quality is somewhat tempered by a negative trend in the percent of wilderness containing invasive plants. Improvement in the untrammeled quality has come from the development and implementation of a fire plan that greatly reduces human interference with the natural fire process as well as a sharp decline in fish stocking. The trend in the undeveloped quality, including occurrences of motorized equipment or mechanical transport, fluctuates yearly but overall is considered to be stable. The trend in opportunities for solitude or primitive and unconfined recreation is also considered to be stable. More information regarding the preliminary trend in wilderness character for the Gros Ventre Wilderness can be found in the project record.

Broad scale information regarding plant community types, derived from aerial imagery combined with on-the-ground validation is available Forest-wide including for the Gros Ventre Wilderness. More specific information regarding plant species composition was collected for the Alkali Creek feedground and a reference site in 2007 (WGFD 2007). Additional information was collected in July and August 2010 regarding the extent and magnitude of browsing effects adjacent to the Alkali Creek feedground (WGFD 2011). As part of the aspen browsing study, measurements were recorded at 119 points inside the Wilderness and 92 points outside the Wilderness. Based on monitoring, browsing effects on aspen were detected within 750 meters of the feedground. The observed effect was browsing on live aspen shoots down to a point where dead twigs in the aspen clump provided protection from further browsing. Since the roots are still alive, the aspen retains its potential to still grow but continual browsing of the same aspen clump would prevent height growth. In areas beyond 750 meters, aspen shoots are growing taller after having been browsed, indicating that ungulate browsing is not preventing aspen from growing to their full potential. The magnitude of the effect is greater closer to the center of the feedground (within 250 meters). Based on this information, browsing effects are detectable on a total of 388 acres of Wilderness (i.e. area within 750 meters of feedground). Aspen are noticeably affected on approximately 25 acres (i.e. more stems are browsed than are growing thus aspen appears to be dying back and older trees exhibit bark scarring). This information is spatially displayed in Figure 19.

Please note that the Alkali Creek feedground boundary shown in Figure 19 is the boundary that was in place prior to 2011. The current boundary does not include Wilderness acres.

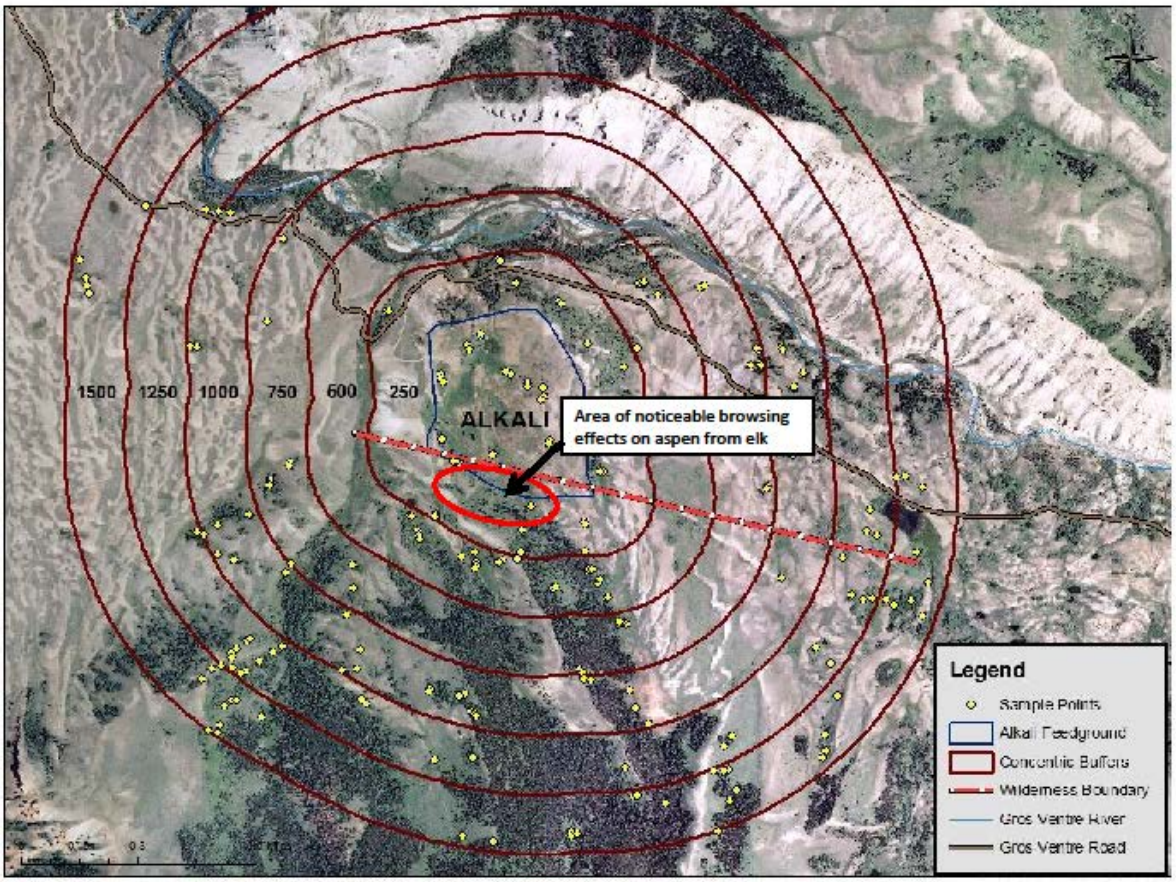

Figure 19: Area of Noticeable Browsing Effect on Aspen from Elk

Weed treatment is conducted annually by Teton County Weed and Pest Department. Noxious weed infestations do occur on the feedground and are being aggressively treated, however Teton County Weed and Pest reports no known infestations in the Wilderness (TCWP, pers. comm. 2012). The plant species composition data collected in 2007 also shows no noxious weeds on the reference site for the Alkali Creek feedground, although non-native smooth brome was present (WGFD 2007). Weed inventories conducted in the Wilderness since 2009 do not show weed infestations in the portion of the Wilderness adjacent to the Alkali Creek feedground.

The Gros Ventre River was designated as a Wild and Scenic River with a "scenic" classification as part of the *2009 Craig Thomas Snake River Headwaters Act*. As a designated river, the Forest Service is required to protect and enhance free flow, water quality, and outstandingly remarkable values. The Forest Service is currently preparing a comprehensive river management plan for designated rivers but preliminary outstandingly remarkable values have been identified along with an interim corridor boundary. Identified outstandingly remarkable values for the Gros Ventre River include scenic, recreational, cultural, ecological/wildlife, fish, and geologic values (*Draft Report on Outstandingly Remarkable Values for the Snake River Headwaters Designated*

Rivers, BTNF 2011). The interim boundary is ¼ mile on either side of the river. Approximately 20 acres of the Alkali Creek feedground are within the mapped interim river corridor (Figure 20).

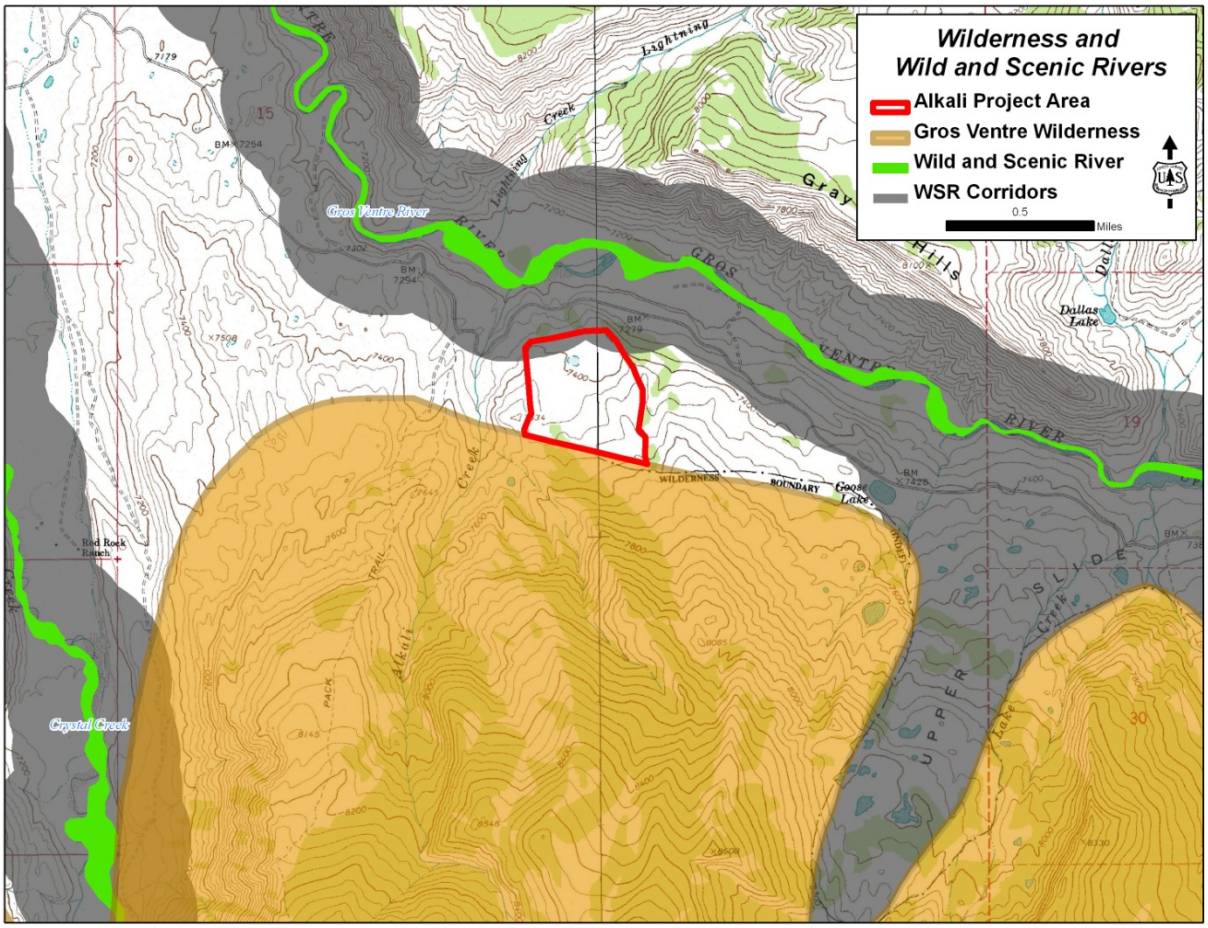

Figure 20: Feedground Location Relative to the Gros Ventre Wilderness and Wild and Scenic River

ENVIRONMENTAL CONSEQUENCES

This section discloses the potential effects of continuing versus not continuing the Alkali Creek feedground on wilderness character in the Gros Ventre Wilderness and on protected qualities of the Gros Ventre Wild and Scenic River. The spatial context for Wilderness and Wild and Scenic River effects includes the feedground permit area, the area within an approximate one-mile radius of the feedground, and the corridor of winter elk migration in the Gros Ventre drainage between the Fish Creek feedground in the upper Gros Ventre to the National Elk Refuge at the lower end of the Gros Ventre drainage. The temporal context for Wilderness is focused on changes that have occurred since the Gros Ventre was designated as Wilderness in 1984. The temporal context for the Wild and Scenic River is the time since the river was designated in 2009.

As noted earlier, the Definition of Wilderness, Section 2(c) of the *1964 Wilderness Act* reveals five inter-related qualities of Wilderness that together, serve to approximate wilderness character. For Wilderness, the alternatives are compared by evaluating their effects on the natural, untrammeled, and undeveloped qualities of wilderness character. The quality associated with "opportunities for solitude or primitive and unconfined recreation" is not affected by this proposal since the area is closed to human presence during the winter months. The fifth quality is also not affected by this proposal since to date, no special features of "scientific, educational, scenic, or historical value" have been identified for the Gros Ventre Wilderness. For the Wild and Scenic River, the alternatives are compared by evaluating their effects on water quality, free-flow and the outstandingly remarkable values, particularly ecological/wildlife values.

Alternative 1 - Effects of Not Issuing a Special Use Authorization (No Action Alternative)

Wilderness - Direct and Indirect Effects

Under this alternative, a Term Special Use Permit would not be issued to the WGFC for use of the Alkali Creek feedground. As described in the wildlife section of this DSEIS, with no feeding operations at Alkali, elk would likely concentrate more at the two feedgrounds located in the upper Gros Ventre drainage (Fish Creek and Patrol Cabin) but would also migrate down drainage to the National Elk Refuge. Browsing effects on vegetation from wintering elk would continue to exist on crucial winter range throughout the Gros Ventre corridor, including the Alkali Creek feedground area. However, with the exception of the two feedgrounds in the upper Gros Ventre, elk would likely be more widely dispersed across crucial winter range and would likely spend less time in one location, thus the browsing effects on vegetation would be reduced. Only a small portion of crucial winter range is located within the Gros Ventre Wilderness and it is all in the Alkali Creek area. Elk are unlikely to migrate into areas of the Wilderness outside of crucial winter range areas due to deep snow. Less browsing of herbaceous plants and aspen saplings on winter range in the Alkali Creek area would allow more aspen stems to grow to their full height potential. This would improve natural conditions in the Wilderness immediately adjacent to the feedground. Recovery of herbaceous vegetation would likely occur within 20 years but aspen recovery would take longer. The untrammeled quality of wilderness would not directly change with elimination of the Alkali Creek feedground permit since no feeding of elk currently occurs within the Wilderness, however less concentration of elk would reduce indirect effects on the untrammeled quality. The undeveloped quality could be indirectly improved by eliminating a potential source of illegal motorized trespass during the spring hunt for antler sheds. Antler hunters target feedgrounds, thinking that the concentration of elk results in concentrations of shed antlers in the surrounding area. In terms of wilderness character, the No Action alternative would result in a slight improvement in the natural, untrammeled and undeveloped qualities and would have no effect on the other qualities of wilderness character.

Wild and Scenic Rivers - Direct and Indirect Effects

Eliminating the Alkali Creek feedground would not affect the free flow of the river since there are no activities within the river bed and banks. Eliminating the feedground would also not affect water quality and fisheries values since the feedground site is located on a bench approximately 160 feet above the river elevation and nearly ¼ mile laterally away from the river with no channel directing rainfall or snowmelt directly into the Gros Ventre River. Feedground

operations do not currently have any adverse effect on identified outstandingly remarkable river values. Recreation values in the river corridor during the winter are associated with activities on the groomed trail – primarily snowmobiling. The ability to view wildlife is an important component of the experience, however eliminating the Alkali Creek feedground would not measurably affect this recreational value since other opportunities to view wildlife exist and the feedground area is not visible from the groomed trail due to the elevational difference. Cultural resource values are not affected as noted elsewhere in this document. Preliminary ecological/wildlife values include the unique habitats associated with landslides and slumps, nesting habitat for raptors, the braided waterways that support birds, the pronghorn migration corridor, winter range for moose and bighorn sheep, and breeding habitat for sage grouse. The feedground does not directly overlap habitats such as landslides or slumps, waterways, and sage-grouse breeding areas. Indirect effects primarily affect big game winter range and are described in the Wildlife section of this document. The feedground structures and operations were part of the baseline conditions identified in 2009 when the river was designated, thus there is no effect from a temporal context.

Cumulative Effects

Past, present or reasonable foreseeable activities considered for this analysis include the 2009 North Zone Designated Motorized Route System decision and implementation activities, on-going winter trail grooming and guided snowmobile tours, wildfires including the 2011 Red Hills Fire, on-going cattle grazing and allotment management planning, on-going recreational stock use including guided day rides, and the 2012 changes in grey wolf management associated with federal de-listing. Of these activities, wildfires are the most likely to affect aspen and plant community species composition. Cattle and recreational stock grazing affect herbaceous vegetation more than aspen. Considering these activities in combination with only a slight improvement in the natural, untrammeled, and undeveloped qualities of wilderness character, there is no cumulative effects on wilderness character associated with this alternative. Similarly, since there are no direct or indirect effects associated with eliminating the feedground on the wild and scenic river corridor, there are no cumulative effects.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Natural Quality of Wilderness - Direct and Indirect Effects

Wilderness is partly defined as an area that is “protected and managed so as to preserve its natural conditions” (Section 2a and 2c). “Natural conditions” can be further defined to mean that the composition, structure and function of native plant communities are intact and influenced primarily by the forces of nature rather than human influence. Since the primary goal is to allow disturbance processes to operate freely with minimal human interference, specific “desired” vegetation conditions are not prescribed in Wilderness. However, protecting native or indigenous plant communities implies that there is no occurrence of exotic species (USFS 1994; Landres et al. 2008). A primary concern regarding the effect of the feedground has been the potential for aspen regeneration to be compromised by elk browsing on aspen shoots, thus impacting plant community structure in the short-term and potentially composition in the long-term. If this occurred or if the presence of the feedground prevented fires from being managed with minimal human interference, the natural quality of wilderness character would be affected.

Elk browsing of aspen adjacent to Alkali Creek feedground was inventoried in July and August of 2010. The technical report describing the methodology, analyses, and results is available for review in the project record (WGFD 2011). The effects of concentrated elk browsing are localized and limited to impact on plant structure. An estimated 388 acres of Wilderness would continue to be affected with continuation of feeding operations at Alkali. While the structural browsing effects are detectable immediately adjacent to the feedground, this effect is within acceptable limits considering the overall natural quality of Wilderness. Plant species composition has not been altered based on the vegetation monitoring conducted on reference sites near the feedground (WGFD 2007). Aspen is persisting as part of the plant community, even within the feedground, despite 42 years of elk browsing (WGFD 2011). Additionally, the plant community in the Wilderness, including the communities associated with aspen are not rare or uncommon within the Gros Ventre drainage (refer to Special Areas report in project record). Noxious species of concern (e.g. musk thistle, spotted knapweed, leafy spurge, cheat grass) are not present, however an exotic grass, smooth brome, is present on the reference site (WGFD 2007; TCWP 2012). Smooth brome may occur in the Wilderness but its presence has not been confirmed. Finally, there is no evidence that the presence of the feedground is altering the natural disturbance processes that shape plant communities at a landscape scale. In fact, the Red Rock wildfire in 2011 burned 9,670 acres in the Alkali area and was managed with no human intervention within the Wilderness. In terms of the temporal context, the feedground has been in the same location since 1970, fourteen years prior to passage of the *Wyoming Wilderness Act*. No expansion of feedground operations has occurred since designation and in 2012 the permit area was reduced by 14 acres due to a more accurate survey and posting of the Wilderness boundary. This change in the permit area means that no feeding will occur in the Wilderness which will help reduce localized effects.

Untrammeled Quality of Wilderness - Direct and Indirect Effects

Wilderness is "recognized as an area where the earth and its community of life are untrammeled by man (Section 2c)." This means that wilderness is essentially free from modern human control or manipulation. The requirement to not "trammel" Wilderness applies inside Wilderness, not outside Wilderness. This quality focuses on decisions or actions that control or manipulate the community of life, not on the effects of those actions (Landres et al. 2008). Since the permit language specifically prohibits any feeding of elk within the Wilderness, there is no direct effect from feedground operations on the untrammeled quality. The higher densities of elk in the area including within the Wilderness would be a slight indirect effect on the untrammeled quality.

Undeveloped Quality of Wilderness - Direct and Indirect Effects

Wilderness is partly defined as "an area of undeveloped federal land….without permanent improvements or human habitation", with "the imprint of man's work substantially unnoticeable (Section 2c)". Expanding settlement and growing mechanization were the forces recognized as causing wild land to be developed and occupied thus, the *Wilderness Act* and implementing regulations prohibit the possession or use of motorized equipment and mechanical transport. Prior to 2009, there were some occurrences of motorized trespass into the Wilderness from those seeking antler sheds when the winter range opened to human use on May 1st. In 2009, a Record of Decision was signed restricting wheeled motor vehicle use to designated routes and prohibiting cross-country motorized travel. Motor vehicle travel must now occur in accordance with the Motor Vehicle Use Map for the Jackson Ranger District. As part of the decision, the

Gros Ventre Road and spur roads above the Slate Creek/Crystal Creek junction, including the road to Alkali Creek feedground, do not open to motor vehicle travel until June 1st. In 2010, the Motor Vehicle Use Map was modified in response to the more accurate survey and posting of the Wilderness boundary. A gate was installed on the spur road and non-system routes were physically closed and rehabilitated to the extent possible. The Alkali Creek feedground area still opens on May 1st to non-motorized travel but such use does not violate Wilderness regulations or affect the undeveloped quality. Because the area is open grassland with few terrain limitations, there is still some potential for unauthorized use by motor vehicles (e.g. ATVs or motorcycles); however, there have been no documented motor vehicle intrusions into the Wilderness during the spring hunt for antler sheds since 2009.

Wild and Scenic River - Direct and Indirect Effects

The effects of re-authorizing the Alkali Creek feedground permit are the same as described under the No Action alternative.

Wilderness - Cumulative Effects

Past, present or reasonable foreseeable activities considered for this analysis include the 2009 North Zone Designated Motorized Route System decision and implementation activities, on-going winter trail grooming and guided snowmobile tours, wildfires including the 2011 Red Hills Fire, on-going cattle grazing and allotment management planning, on-going recreational stock use including guided day rides, and the 2012 changes in grey wolf management associated with federal de-listing. Of these activities, wildfires are the most likely to affect aspen and plant community species composition. Cattle and recreational stock grazing affect herbaceous vegetation more than aspen. Considering these activities in combination with only a slight effect on the natural, untrammeled, and undeveloped qualities of wilderness character, there is no cumulative effects on wilderness character associated with this alternative.

Wild and Scenic River Corridor - Cumulative Effects

Since there are no direct or indirect effects associated with eliminating the feedground on the wild and scenic river corridor, there are no cumulative effects.

Social and Economic

The social or economic effects are not expected to vary from implementation of the Proposed Action or No Action alternatives. In both Alternatives, WGFC would continue to operate their winter elk management activities on private, state, and federal lands. Whether or not National Forest System lands are available, the program would continue with no expected change to the social or economic environment. Elk population numbers would not be affected by any actions described in the alternatives; therefore there would be no impacts to tourism or other wildlife related economies.

Climate Change

Climate is one of the primary drivers of the physical and ecological processes that determine the distribution, structure, and function of ecosystems. Moreover, there is evidence that climate has changed in the past century and will continue to change. This analysis considers two types of climate change effects.

- **The effect of the No Action and the Proposed Action alternatives on climate change:** (greenhouse gas (GHG) emissions and carbon cycling). Examples include: short-term GHG emissions and alteration to the carbon cycle caused by hazardous fuels reduction projects, GHG emissions from oil and gas field development, and avoiding large GHG emissions pulses and effects to the carbon cycle by thinning overstocked stands to increase forest resilience and decrease the potential for large scale wildfire.
- **The effect of climate change on a proposed project:** Examples include: effects of expected shifts in rainfall and temperature patterns on the seed stock selection for reforestation after timber harvest and effects of decreased snow fall on a ski area expansion proposal at a marginal geographic location, such as a southern aspect or low elevation.

Five variables were considered in this analysis: temperature, precipitation, stream-flow, drought, and snowpack.

The following changes in Western Wyoming's climate and hydrologic systems are predicted by many members of the scientific community over the next several decades. Some changes are already apparent. (Karl et al. 2009; Harris et al. 2006; Furniss et al. 2010)

- Average air temperature is expected to increase. Summer temperatures are projected to increase by up to 7 to 10 degrees F by 2080-2099 compared with a 1960 to 1979 baseline.
- Approximately 5-10 percent increase in spring precipitation is expected compared with a 1960-1979 baseline by the 2080s-2090s. The proportion of precipitation falling as snow is expected to decrease.
- More extreme events are expected (droughts, heat waves, floods, heavy rainfall events). Longer, more severe droughts are expected between rains.
- In this snowpack-dominated runoff regime, timing of peak runoff is expected to shift to earlier in the spring and base flows (summer low flows) will be lower.
- Water temperatures are expected to increase, especially during low-flow periods (summer). As a result, dissolved oxygen levels in water bodies will be lower.
- Higher magnitude storm events are expected to lead to increased sediment production from uplands, so higher amounts of sediment (and associated pollutants) would occur in runoff and there would be higher amounts delivered to downstream water bodies.
- Increased frequency of wildfires would result in increased nutrient inputs to streams. Higher water temperatures would increase stream productivity, further decreasing dissolved oxygen levels.

Use of petroleum resources and motor vehicle emissions result in release of carbon dioxide gas which contributes to increasing atmospheric greenhouse gas (GHG) concentration and increased climate change effects. WGFC uses petroleum and motor vehicles while performing winter elk management activities. An average of 183 tons of hay are purchased and delivered to the feedground during summer and fall annually, requiring about nine truckloads of round trip traffic from the hay origination location. Feeders use motor vehicles to deliver the horses to the feedground in late fall and to travel to and from the feedground to feed and water the horses daily. Once feeding begins, feeders typically reside at Patrol Cabin and use snowmobiles or horse teams to access Alkali Creek feedground. Elk feeding is performed using draft horses.

As plants grow, they remove carbon from the air and sequester it. When animals eat plants, they emit carbon as respiratory gas and excreted waste. Sequestering carbon contributes to decreasing atmospheric GHG while release of carbon dioxide as gas contributes to atmospheric GHG.

When the predicted changes in Western Wyoming's climate and hydrologic systems occur over the next several decades, winters will be shorter, spring will be wetter and summer and fall will be drier. As snow recedes earlier, elk will be able to move off of feedground and onto natural forage sooner in the spring. As natural forage cures and dries earlier in the summer, elk will move higher in elevation seeking relief from high temperatures and seeking forage. Suitable elk forage will grow at higher elevations than at the present time. Elk will likely remain at higher elevations later in the fall, returning to the feedgrounds for a shorter feeding season.

Water resources are projected to be profoundly influenced by climate change, including changes in timing and duration of hydrologic regimes and water temperatures, altering food web interactions, species diversity, and nutrient dynamics. Reduced water storage as snow, early runoff, and an increase in evaporation due to warmer summer temperatures would likely reduce habitat for adult amphibians. Impacts could include earlier breeding, resulting in more frequent exposure to killing frosts and a longer larval period because water temperatures warm more slowly in early spring, leading to higher larval mortality.

Sagebrush steppe is one of the most altered ecosystems in the intermountain West. Changes in climate are expected to further alter fire regimes and increase invasive species in sagebrush steppe and low-elevation woodlands.

Alternative 1 - Effects of Issuing No Special Use Authorization (No Action Alternative)

Direct and Indirect Effects

If winter elk management activities were eliminated at Alkali Creek feedground, motor vehicles would be used to demolish and remove the existing facilities from National Forest System lands. WGFD has indicated that, in this alternative scenario, no change would occur to elk herd population objectives, therefore the same amount of elk currently fed at three feedgrounds in the Gros Ventre would be fed at the two remaining feedgrounds, Patrol Cabin and Fish Creek. There would therefore be an additional amount of petroleum resources used and motor vehicle (greenhouse gas (GHG)) emissions, because the hay that is currently stored at Alkali Creek feedground would be stored at either Patrol Cabin or Fish Creek which are further from the National Forest boundary. To store additional hay, WGFD would need to construct a new hayshed at Patrol Cabin, which would also result in use of motor vehicles and increased GHG

emissions. Feeders would no longer need to travel from Patrol Cabin to Alkali Creek to feed elk or horses, so a small decrease in the amount of GHG emissions would result. The amount of increased GHG emissions resulting from the demolition, removal, and construction of facilities and the longer distance for hay hauling, buffered by a small decrease in emissions related to reduced commuting by feeders would result in an overall small increase in emissions. This amount of increased GHG emissions would not be a significant contribution to climate change effects.

A change in the carbon cycle would result from eliminating activities at Alkali Creek feedground. Aspen and woody shrubs that are currently suppressed by elk browsing would recover over time and sequester more carbon dioxide. Since elk that currently feed at Alkali Creek feedground would continue to be fed (at Patrol Cabin and Fish Creek Feedground), carbon would continue to be eaten and then emitted by fed elk and the horses used in the feeding operation. The very small overall increase in carbon sequestration by plants would not be a significant contribution to climate change effects.

WGFD has indicated that, under the no action scenario, no change would occur to elk herd population objectives, therefore the same amount of elk currently fed at three feedgrounds in the Gros Ventre would be fed at the two remaining feedgrounds, Patrol Cabin and Fish Creek. The predicted warmer weather with less snow and more spring rain would improve natural forage opportunities for elk and result in a reduced season for feeding at these two feedgrounds. Recovery of disturbed soils and affected vegetation at Alkali Creek feedground would occur within 10 to 20 years after the feedground is eliminated, which is well before the predicted climate change effects.

Alternative 2 – Effects of Issuing a Special Use Authorization (Proposed Action Alternative)

Direct and Indirect Effects

If winter elk management activities were continued at Alkali Creek feedground, WGFD would continue to use motor vehicles to deliver and store hay, deliver, feed and water the horses, and feed elk. Carbon would continue to be eaten and then emitted by fed elk and the horses used in the feeding operation. The amount of carbon dioxide gas that would continue to be emitted would not be a significant contribution to increasing atmospheric GHG concentration or increased climate change effects.

The predicted warmer weather with less snow and more spring rain would improve natural forage opportunities for elk and result in a reduced season for feeding at Alkali Creek feedground. Over time, vegetation at Alkali Creek feedground would change, adapting to the adjusted temperature and hydrological regime. The predicted climate change would further stress aspen that is heavily browsed and would likely result in increased mortality in the nine acres of aspen within the immediate project area and in aspen within 1,600 feet of the feedground permit boundary.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which p and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Continued use of National Forest System lands for WGFC's winter elk management activities affects the long-term productivity of riparian areas within the project area and in the portion of the analysis area immediately adjacent to the project area. As described in previous sections, riparian areas support a variety of wildlife [and fish] populations.

Concentrating large numbers of elk on feedgrounds could affect the rate of spread of disease, such as chronic wasting disease, if it were to become established in the analysis area. The decision to be made by the Forest Service under either alternative would have no effect on whether or not chronic wasting disease arrives in the analysis area, or the potential rate of spread of the disease, since feeding would continue with or without the use of National Forest System land.

Unavoidable Adverse Effects

Feedground practices create unavoidable impacts on the National Forest. These effects are discussed in detail throughout the document.

- Detrimental soil disturbance would occur as a result of compaction and erosion caused by cross country travel by horses, machinery, and equipment and trampling by elk.
- Vegetation species richness, diversity, and vigor would be affected.
- Water quality would be affected by wetland and stream bank damage, erosion and sedimentation in both alternatives.
- Wildlife would be affected by impacts to sagebrush, riparian, and aspen wildlife habitat in both alternatives.
- Feedgrounds increase the probability of disease and parasite transmission among elk, including brucellosis, chronic wasting disease and other diseases.
- Elk browsing of aspen adjacent to Alkali Creek feedground would affect the natural quality of wilderness character by altering plant structure on approximately 388 acres in the Gros Ventre Wilderness.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

Irreversible losses could occur in willow habitat within and adjacent to feedgrounds due to loss of root stock as continued heavy browsing by elk in the winters prevents suppressed willow plants in wet meadow habitat from recovering to a healthy condition. Irretrievable losses of aspen habitat could occur due to heavy browsing.

The potential exists for irretrievable commitments of both elk and deer resources if chronic wasting disease (CWD) became established in western Wyoming and substantially reduces these populations. While the arrival of CWD is beyond the control of wildlife managers, the potential effect would be greater under any alternative where large numbers of animals are concentrated on feedgrounds. The loss would be irretrievable because in addition to always being fatal to infected animals, chronic wasting disease contaminates the environment for long periods of time.

Soil on the feedground could become a reservoir of CWD that would continue to infect animals many years into the future. This is considered an irretrievable loss (loss for a period of time) rather than an irreversible loss (cannot ever be reversed) because it is not known how long contamination of the environment would persist. Decontamination methods on game farms and research facilities have been unsuccessful and animals introduced to these facilities years after a chronic wasting disease outbreak and depopulation have subsequently become infected.

The potential exists for irretrievable commitments of predator and scavenger resources to occur if CWD became established and substantially reduced the elk population. (*U. S. Fish and Wildlife Service and National Park Service Bison and Elk Management Plan and Environmental Impact Statement* (2007)).

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare EISs concurrently with and integrated with …other environmental review laws and executive orders" including the following:

- American Antiquities Act of 1906
- American Indian Religious Freedom Act of 1978
- Archeological Resource Protection Act of 1979
- Clean Air Act of 1979 (as amended)
- Clean Water Act of 1977 (as amended)
- Endangered Species Act of 1973 (as amended)
- Energy Policy Act of 2005 (Public Law 109-58)
- Executive Order 11593 (cultural)
- Executive Order 11644 (Use of Off-Road Vehicles)

- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)
- Executive Order 13007 (American Indian sacred sites)
- Executive Order 13112 (Invasive Species)
- Executive Order 13175 (consultation and coordination with Indian Tribal Governments)
- Executive Order 13186 (Migratory Bird Treaty)
- Forest and Rangeland Renewable Resources Planning Act of 1874 (as amended)
- Magnuson-Stevens Fishery Conservation and Management Act of 1996
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- National Forest Management Act (NFMA) of 1976
- National Historic Preservation Act of 1966 (as amended)
- Native American Graves Protection and Repatriation Act of 1990
- Rescissions Act of 1995 (as amended)
- Wilderness Act of 1964

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Distribution of the DSEIS

This DSEIS will be posted electronically at the Bridger-Teton National Forest website http://www.fs.usda.gov/projects/btnf/landmanagement/projects and distributed to individuals who specifically request a copy of the document. A notice of availability of the Final EIS will be sent to those who submitted comments during the scoping period and to the Federal agencies, federally recognized tribes, State and local governments, and organizations listed above.

Appendices

Appendix 1 – Wyoming Game and Fish Feedground Data

Appendix 2 – Elk Feedgrounds in Wyoming, WGFD, August 30, 2004

Appendix 3 - Chronic Wasting Disease Management Plan, Summary, 2006

Appendix 4 – Photographs of Alkali Creek Feedground

Appendix 5 – Past, Present and Foreseeable Future Actions

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Appendix 1

Combined data for Alkali, Patrol Cabin, and Fish Creek feedgrounds, 1975-76 through 2011-12.

YEAR	# ELK	TONS	DAYS	DEAD	COST/ELK	TONS/ELK	LBS/ELK/DAY
1975-76	1713	671	101	8	$25	0.39	7.7
1976-77	0	0	0	0	$0	0.00	0.0
1977-78	1735	659	91	13	$27	0.38	8.3
1978-79	1854	745	98	17	$26	0.40	8.2
1979-80	2007	626	90	11	$22	0.31	6.9
1980-81	0	0	0	0	$0	0.00	0.0
1981-82	2099	945	113	19	$37	0.45	8.0
1982-83	1437	548	97	11	$35	0.38	7.8
1983-84	1584	538	98	7	$44	0.34	7.0
1984-85	1338	413	75	8	$33	0.31	8.2
1985-86	1671	554	77	12	$34	0.33	8.6
1986-87	1225	479	80	6	$39	0.39	9.8
1987-88	1567	539	81	2	$34	0.34	8.5
1988-89	2550	948	117	80	$38	0.37	6.4
1989-90	1979	649	83	8	$38	0.33	7.9
1990-91	1469	477	102	15	$40	0.32	6.4
1991-92	1186	426	70	6	$44	0.36	10.3
1992-93	1688	799	96	11	$55	0.47	9.8
1993-94	1507	421	71	0	$31	0.28	7.9
1994-95	2186	757	113	11	$37	0.35	6.1
1995-96	1770	710	93	7	$47	0.40	8.6
1996-97	2260	963	105	53	$52	0.43	8.1
1997-98	1940	802	99	13	$64	0.41	8.4
1998-99	2325	1002	89	10	$51	0.43	9.7
1999-00	2462	688	80	18	$43	0.28	7.0
2000-01	2658	981	84	6	$64	0.37	8.8
2001-02	2621	985	64	49	$50	0.38	11.8
2002-03	2195	414	71	5	$34	0.19	5.3
2003-04	2839	967	80	30	$52	0.34	8.6
2004-05	2941	568	81	8	$48	0.19	4.7
2005-06	3221	917	62	57	$37	0.28	9.2
2006-07	2922	867	79	20	$77	0.30	7.5
2007-08	2279	1017	88	6	$64	0.45	10.1
2008-09	1200	143	30	4	$14	0.12	11.9
2009-10	1880	212	30	0	$44	0.11	16.7
2010-11	2546	1254	97	48	$77	0.49	10.0
2011-12	2602	415	63	6	$39	0.16	5.1
1975-2012 Avg.	1931	651	80	16	$40	0.32	8.0

Data for Alkali feedground, 1975-76 through 2011-12.

YEAR	# ELK	TONS	DAYS	DEAD	COST/ELK	TONS/ELK
1975-76	608	269	106	3	$29	0.44
1976-77	0	0	0	0	$0	0
1977-78	349	170	91	4	$34	0.49
1978-79	660	271	99	8	$27	0.41
1979-80	542	185	89	1	$23	0.34
1980-81	0	0	0	0	$0	0
1981-82	724	350	119	6	$40	0.48
1982-83	375	139	93	6	$36	0.37
1983-84	437	236	107	3	$46	0.54
1984-85	223	73	77	1	$35	0.32
1985-86	466	173	78	1	$36	0.37
1986-87	325	118	84	1	$42	0.36
1987-88	336	100	80		$36	0.3
1988-89	450	204	118	5	$47	0.45
1989-90	480	138	83	5	$36	0.29
1990-91	432	183	140	3	$53	0.42
1991-92	225	115	71	0	$60	0.51
1992-93	482	218	107	1	$56	0.45
1993-94	800	240	104	0	$32	0.3
1994-95	407	121	90	2	$38	0.3
1995-96	380	106	82	0	$36	0.28
1996-97	800	319	82	7	$47	0.4
1997-98	930	342	119	5	$53	0.37
1998-99	939	315	90	3	$41	0.34
1999-00	1140^(46)	142^	92	7	16^	0.12^
2000-01	853^(8)	126^	70	2	21^	0.15^
2001-02	1188^	389^	90	16	47^	0.38^
2002-03	2100^(1650)	320^	101	1	28^	0.15
2003-04	1214	417	72	16	$41	0.33
2004-05	0	0	94	0	$0	0
2005-06	675	55	47	11	$14	0.08
2006-07	55	46	72	1	$168	0.84
2007-08	12	222	87	0		
2008-09	1200	143	20	4	$14	0.12
2009-10	1700	86	29	0	$9	0.05
2010-11	412	323	123	25		0.78
2011-12	2345	132	63	0	$14	0.06
1975-99 Avg.	473#	183#	83	4	37#	0.36#

*Number in ( ) indicates the number counted when the elk were classified.

^ Wolves chased the elk among the three Gros Ventre feedgrounds altering these values and making comparisons with other years meaningless.

Average values refer to years prior to 1999-2000.

Data for Patrol Cabin feedground, 1975-76 through 2011-12.

YEAR	# ELK	TONS	DAYS	DEAD	COST/ELK	TONS/ELK
1975-76	525	149	98	1	$18	0.28
1976-77	0	0	0	0	$0	0
1977-78	627	195	92	3	$22	0.31
1978-79	594	226	94	5	$24	0.38
1979-80	831	237	92	5	$20	0.29
1980-81	0	0	0	0	$0	0
1981-82	548	234	113	6	$35	0.42
1982-83	342	126	90	2	$34	0.37
1983-84	147	66	81	1	$50	0.45
1984-85	240	76	61	2	$35	0.32
1985-86	480	121	71	1	$23	0.25
1986-87	300	100	72	2	$33	0.33
1987-88	388	100	79	0	$29	0.26
1988-89	1000	279	114	33	$27	0.28
1989-90	538	163	75	0	$37	0.3
1990-91	443	126	77	3	$34	0.28
1991-92	808	262	60	3	$36	0.32
1992-93	280	134	105	2	$54	0.48
1993-94	477	123	49	0	$30	0.26
1994-95	644	155	122	5	$28	0.24
1995-96	477	221	93	1	$52	0.46
1996-97	330	169	113	1	$62	0.51
1997-98	281	134	88	0	$73	0.48
1998-99	605	318	90	1	$58	0.53
1999-00	2500^(2140)	466^	73	10	19^	0.19^
2000-01	2650^	483^	91	2	21^	0.18^
2001-02	2600^(823)	512^	73	27	86^	0.62^
2002-03	1200^(411)	74^	64	3	28^	0.18^
2003-04	1300^(379)	253	90	12	87^	0.67^
2004-05	1635	292	87	4	$22	0.18
2005-06	1998	592	89	27	$36	0.3
2006-07	2845	361	87	6	$17	0.13
2007-08	2251	597	88	6		
2008-09	0	0	0	0	$0	0
2009-10	180	126	30	0	$122	0.7
2010-11	2122	584	70	10		
2011-12	231	194	63	4	$193	0.84
1975-99 Avg.	448#	148#	77	5	33#	0.32#

*Number in ( ) indicates the number counted when the elk were classified.

^ Wolves chased the elk among the three Gros Ventre feedgrounds altering these values and making comparisons with other years meaningless.

Average values refer to years prior to 1999-2000.

Data for Fish Creek feedground, 1975-76 through 2011-12.

YEAR	# ELK	TONS	DAYS	DEAD	COST/ELK	TONS/ELK
1975-76	580	253	100	4	$28	0.44
1976-77	0	0	0	0	$0	0
1977-78	759	294	91	6	$26	0.39
1978-79	600	248	101	4	$28	0.41
1979-80	634	204	89	5	$24	0.32
1980-81	0	0	0	0	$0	0
1981-82	827	361	106	7	$35	0.44
1982-83	720	283	109	3	$35	0.39
1983-84	1000	236	105	3	$36	0.24
1984-85	875	264	88	5	$29	0.3
1985-86	725	260	81	10	$43	0.36
1986-87	600	261	84	3	$41	0.44
1987-88	843	339	83	2	$37	0.4
1988-89	1100	465	118	42	$39	0.42
1989-90	961	348	90	3	$41	0.36
1990-91	594	168	89	9	$32	0.28
1991-92	153	49	79	3	$36	0.32
1992-93	926	447	77	8	$54	0.48
1993-94	230	58	59	0	$30	0.25
1994-95	1135	481	126	4	$46	0.42
1995-96	913	383	104	6	$52	0.42
1996-97	1130	475	119	45	$47	0.42
1997-98	729	326	89	8	$66	0.45
1998-99	781	369	87	6	$53	0.47
1999-00	1500^(276)	80^	76	1	8^	0.05^
2000-01	2000^(0)	372^	90	2	22^	0.19^
2001-02	610^	84^	28	6	18^	0.14^
2002-03	134^	20^	47	1	36^	0.15^
2003-04	1246	297	77	2	$29	0.24
2004-05	1306	276	63	4	$26	0.21
2005-06	548	270	50	19	$62	0.49
2006-07	22	460	77	13	$2,722	543
2007-08	16	198	86	0		
2008-09	0	0	0	0	$0	0
2009-10	0	0	0	0	$0	0
2010-11	12	347	98	13		
2011-12	26	89	62	2	$910	3.42
1975-99 Avg.	697#	270#	76	7	35#	0.35#

*Number in ( ) indicates the number counted when the elk were classified.

^ Wolves chased the elk among the three Gros Ventre feedgrounds altering these values and making comparisons with other years meaningless.

Average values refer to years prior to 1999-2000.

Appendix 2

Elk Feedgrounds in Wyoming

August 30, 2004

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Introduction

Elk management in northwestern Wyoming has been challenging since Europeans first settled the area in the late 1800s. Even prior to any significant settlement of elk wintering areas like Jackson Hole, there were reports of thousands of elk starving to death during hard winters, and with the first settlers came reports of elk raiding ranchers' haystacks. The early settlers didn't want to see the elk die, but at the same time, they could not afford to lose precious hay needed to carry livestock through the winter. The obvious solution was to create areas where elk could be fed, thus avoiding large-scale die-offs while keeping the animals out of ranchers' hay. This is precisely what took place with the first and largest elk feedground, the National Elk Refuge, created in 1912.

Early wildlife managers did not foresee the consequential problems elk feedgrounds would create. While the creation of feedgrounds addressed the problems of elk die-offs and damage to stored hay crops, it exacerbated the problem of disease transmission. What started as a logical solution to some very real problems, has become one of the most complex and controversial wildlife management challenges of the 21st century.

The purpose of this paper is to provide factual information on the many different facets of elk feedgrounds in northwest Wyoming. There have been volumes written on the various issues involving elk feedgrounds over the years. This document is not intended to cover every aspect of every issue, but rather provide a well-rounded discussion on the topic as a whole, providing key, factual information on what we believe to be the most important issues surrounding elk feedgrounds.

History of Feedgrounds in Wyoming

The National Elk Refuge was the first elk feedground in Wyoming, created in 1912. By the late 1880s, human settlement and conversion of historic elk winter range to use by domestic livestock had already begun to compromise elk habitat and their migration routes to wintering areas. However, even before extensive settlement of Jackson Hole, early hunters and settlers noted unusually heavy snows resulted in the death of thousands of elk. Severe winters in 1909, 1910, and 1911 reportedly took a heavy toll on elk numbers. In 1910, the Wyoming legislature appropriated $5,000 to purchase all available hay in the Jackson Hole valley to feed elk. Thus began the first government-subsidized feeding of wildlife in northwest Wyoming. The supply of hay was inadequate and elk raided ranchers' haystacks. Despite these early efforts, many elk starved to death.

The first official suggestion for a permanent elk refuge was by Wyoming State Game Warden, D.C. Nowlin, in 1906. After retiring as State Game Warden, Nowlin became the first manager of the National Elk Refuge. In 1911, the Wyoming legislature requested a Congressional appropriation for "…feeding, protecting, and otherwise preserving the big game which winters in great numbers within the confines of the State of Wyoming." One month later, Congress appropriated $20,000 for feeding, protecting, and transplanting elk and ordered an investigation

of the elk situation in Wyoming. Following this assessment, Congress appropriated $45,000, on August 10, 1912, for the purchase of lands and maintenance of a refuge for wintering elk.

By 1916, a combination of public and private lands formed the 2,760-acre National Elk Refuge. Several additions have been made since then, increasing the total acreage to nearly 25,000 acres today. Due to the location of the town of Jackson and other development in the Jackson Hole Valley, it is estimated that only one-quarter of the historic elk winter range remains.

The Jackson elk herd is one of the largest elk herds in the world, with a 2004 winter population estimated at 13,500. The population objective for the Jackson elk herd is 11,029, established by the Wyoming Game and Fish Commission in 1987. Annually, 45-65% of the Jackson elk herd winters on the National Elk Refuge. A 1974 Memorandum of Understanding (MOU) between the Wyoming Game and Fish Commission and National Elk Refuge calls for a maximum of 7,500 elk on feed in any given winter on the refuge. Each year, forage conditions are monitored regularly by Game and Fish and National Elk Refuge personnel. The decision of when to start and stop feeding is typically made jointly.

The elk on the National Elk Refuge are annually counted and classified through a group effort by local representatives from the various natural resource management agencies. The fewest elk ever fed on the refuge was 3,110 during the winter of 1930-31. The highest recorded number was in 1996, when 10,736 elk were counted. The average number of elk fed on the refuge from 1999-2003 is just over 6,000 elk. Elk are typically on the refuge for about six months, from November through April of each year. On average, the elk are fed for about 2.5 months from late January until early April. There have been nine winters since the refuge was created when the elk were not fed at all.

In 1975, the National Elk Refuge made a change from feeding baled hay to pelleted alfalfa. Managers determined that pelleted alfalfa was easier to distribute in large quantities and maintained its quality better while in storage. Currently, feeders use mechanized equipment to lay down lines of alfalfa pellets at four different locations on the refuge.

Annually, the cost for the alfalfa pellets to feed the refuge elk is about $300,000. This cost is split equally between the Wyoming Game and Fish Department and National Elk Refuge. Additionally, local Boy Scouts collect the elk antlers shed on the refuge and sell them at the annual antler auction in Jackson. This typically generates approximately $80,000 each year. The Boy Scouts keep 20% of the proceeds and the remainder goes to help fund feeding of the elk.

In 1958, the Cooperative Elk Studies Group was formed, composed of representatives of the Wyoming Game and Fish Department, National Elk Refuge, Bridger Teton National Forest, and Grand Teton National Park. All four agencies have legal responsibilities pertaining to the management of the Jackson elk herd. The group meets annually to share information and coordinate management and research of elk.

More recently, the Jackson Interagency Habitat Initiative (JIHI) was formed during fall 2001 by several wildlife biologists from the above agencies. The goal of JIHI is to maximize

effectiveness of native winter and transitional range for ungulates and a diversity of species indigenous to this region through identification of habitat enhancement opportunities. The group is focusing on habitat enhancements in Buffalo Valley and the Gros Ventre River drainage.

Wyoming Game and Fish Feedgrounds

In 1929, supplemental feed was left in metal sheds in the drainages of the Upper Green River, Gros Ventre, and Greys River by the Game and Fish Department in an effort to prevent large scale die-offs of elk during severe winters. It was understood that during severe winters someone would snowshoe to these sheds and put out hay in an attempt to reduce winter losses. This marked the beginning of supplemental winter-feeding of elk by the Game and Fish Department (Dean, et. al. 2003).

Wyoming's first damage law was enacted in 1939, imposing limited liability on the Game and Fish Commission to pay for damages to crops caused by big game animals. This legislation created a significant financial burden to the Game and Fish Commission and largely contributed to the establishment of elk feedgrounds in Wyoming. Wildlife managers found it was easier and less expensive to feed elk in key problem areas rather than continually try to keep elk out of haystacks.

Elk were fed at many different locations during the 30-plus years following the creation of the damage law, primarily to prevent damage to stored and fed hay and growing crops. Many sites were temporary and only small amounts of hay, or cake, were fed. The Game and Fish Department has fed elk in at least 51 different locations since 1948. Many of the present feeding sites were started in the late 1940s and early 1950s. By the early 1960s, the present elk feedground system was mostly in place, with the last two feedgrounds started in the 1970s.

Currently, the Game and Fish Department manages 22 state-operated elk feedgrounds. In addition, the National Elk Refuge is managed by the U.S. Fish and Wildlife Service. In 2004, the annual cost to the Game and Fish Department for managing its entire feedground program was approximately $1.36 million.

The 22 state feedgrounds are located in Teton, Lincoln, and Sublette counties on BLM, Forest Service, state, and private land holdings. Annually, the average number of elk fed on all 22 state feedgrounds (not including the National Elk Refuge) since 1975 is approximately 13,000 elk. The highest number recorded was in 1988-89, when the Game and Fish Department fed a total of 16,967 elk. Conversely, the lowest number of elk fed since 1975 occurred during the winter of 1976-77, when only 4,964 elk were fed.

Elk are typically fed with a team of draft horses and a sleigh. Elk are fed seven days a week, with most feedgrounds starting in late November and ending in mid April. Small square bales of grass or alfalfa hay are generally used. Feeders try to disperse elk as much as possible and feed on clean snow each day.

The Game and Fish Department purchases between 6,000-9,000 tons of hay annually, with the majority of the hay being small square bales. The Department prefers certified weed-free hay

and makes every effort to purchase only certified hay. Most hay is purchased from Teton, Lincoln and Sublette County ranches, with some hay coming from Idaho each year. The Department contracts the hauling, which typically takes about four months to complete. Each feedground has several sheds where the hay is stored.

Elk feeders are contracted seasonally by the Game and Fish Department and may feed at one or more feedgrounds each year. Individual elk are generally fed between eight and ten pounds of hay per day. The feeding season ranges from 70 to 160 days, depending on severity of the winter and location of the feedground. The average length of the feeding season is 127 days. This equates to approximately 0.5 ton of hay per elk each year.

The Game and Fish Department has experimented with feeding one-ton bales with tractors on several different feedgrounds, but has encountered problems with getting tractors started during cold spells. Consequently, the majority of the feeding is still being done with teams of draft horses pulling a sleigh or wagon.

Just as there are population objectives set for each elk herd, there are also numerical quotas set for each feedground within those herds. Both herd objectives and feedground quotas are established by the Wyoming Game and Fish Commission. It would require Commission approval to initiate a new elk feedground or terminate an existing feedground. At times, the Game and Fish Department has deemed it necessary to implement emergency temporary feeding under unique circumstances. This action requires approval by the Game and Fish Commissioner for that region.

National Elk Refuge vs. State Feedgrounds

There are significant differences between the feeding operations on the National Elk Refuge and the 22 state elk feedgrounds. The size of the National Elk Refuge, at nearly 25,000 acres, and its reduced amount of snow, are probably the biggest differences. Most of the state-operated feedgrounds are approximately 75 acres and are typically located on transitional range or at an elevation higher than traditional winter range. Additionally, state feedgrounds are often close to private land damage situations with no fence to prevent elk from moving from the feedground.

While the elk refuge has to accommodate a higher number of elk (7,500 vs. an average of 600 on each state feedground), the National Elk Refuge has a much higher ratio of land per elk. This, combined with less snow cover, allows the elk refuge to feed fewer days per year and less per elk. The refuge feeds approximately 3-5 pounds of pellets per elk per day, versus 8-10 pounds of hay per elk per day on state feedgrounds.

The Game and Fish Department experimented with feeding alfalfa pellets at the Greys River feedground, but the elk caused extensive damage to woody plants, and even wooden corrals, in an attempt to find necessary roughage. One consequence of feeding alfalfa pellets was the elk tended to spend less time on the feedline when they dispersed to find roughage. Thus, they tended to have a greater impact on woody vegetation than they otherwise would if fed baled hay.

Elk Population Dynamics

There are eight elk herd units managed by the Game and Fish Department's Jackson/Pinedale Region. Elk in seven of the eight herd units are supplementally fed during the winter months. Herd units are defined as populations with less than 10% interchange with adjacent herd units. Naturally, elk populations fluctuate from year to year. Table 1 presents the results from the 2004 winter elk counts as well as the long-term average (27 years) and individual feedground quotas. The winter of 2004 was average to above-average for snow accumulation. Subsequently, feedground attendance was above the long-term average for many feedgrounds. Over the past 27 winters, an average of 20,500 (including the National Elk Refuge) elk per year have been provided supplemental winter feed.

Table 1. Elk Herd Units and Feedgrounds in western Wyoming.

Herd Unit	Feedground	Elk Trend Count Data 2004	1976-2002 Ave.	Feedground Objective
Afton	Greys River	810	853	1000
	Forest Park	771	696	750
Fall Creek	Camp Creek	1004	754	900
	Dog Creek	1214	766	800
	Horse Creek	1346	1064	1250
	South Park	1401	984	1000
Hoback	Dell Creek	230	253	400
	McNeel	680	574	600
Jackson	Alkali	1246	454	800
	Fish Creek	379	697	1000
	Patrol Cabin	1214	448	650
	Natl. Elk Refuge	5876	7436	7500
Pinedale	Fall Creek	547	648	700
	Muddy Creek	486	600	600
	Scab Creek	710	488	500
Piney	Bench Corral	813	390	250
	Finnegan	205	333	400
	Franz	428	397	450
	Jewett	750	590	650
	North Piney	0	388	400
U. Green River	Black Butte	423	493	500
	Green River Lakes	356	510	675
	Soda Lake	355	727	800

Winter feedgrounds support the majority of elk in the Jackson/Pinedale Region (Table 2). Annual elk survey data comparing elk on feed versus elk on native winter range over the past 5 years (2000-2004) indicates 80% of all elk winter at designated feedgrounds. Feedground attendance over the last 5 years has varied from 71% in the Jackson Herd Unit to 96% in the Fall Creek Herd Unit (Table 2). Options for elk utilizing native ranges vary greatly among the 7 elk herd units.

Table 2. Percent of elk on feedgrounds (FG) compared to native winter range (NWR), 2000-2004.

	2000		2001		2002		2003		2004		5 Yr. Ave.	
Herd Unit	**FG**	**NWR**	**FG**	**NWR**	**FG**	**NWR**	**FG**	**NWR**	**FG**	**NWR**	**FG**	**NWR**
Afton	88	12	86	14	87	13	69	31	81	19	82	18
Fall Creek	95	5	96	4	97	3	93	7	96	7	96	4
Hoback	90	10	97	3	94	6	82	18	87	13	90	10
Jackson	61	39	71	29	74	26	74	26	72	28	71	29
Pinedale	86	14	96	4	99	1	81	19	96	4	92	8
Piney	74	26	88	12	86	14	88	12	83	17	83	17
U. Green River	84	16	65	35	94	6	79	21	87	13	81	19
Total	89	11	79	21	85	15	79	21	82	18	80	20

During winters with less than average snowfall, a portion of elk will remain on native ranges as long as forage is available. This varies greatly among the various feedgrounds and native range complexes. For example, 35%, or more than 800 elk in the Upper Green River Herd Unit wintered on native habitat during the winter of 2001 (Table 2). Snow accumulations were far below normal and native forage was available throughout the winter months. Conversely, the winter of 2004 was average to above-average and elk correspondingly left winter habitat in favor of supplemental hay at feedgrounds. The 2004 surveys indicate that 13%, or approximately 250 elk, foraged during the winter months on native habitat in the Upper Green River Herd Unit (Table 2).

Nearly all of the 22 state-operated feedgrounds were established to prevent elk damage to stored hay crops and prevent co-mingling with livestock on private lands. One additional outcome of the supplemental feeding program has been the near elimination of natural over-winter mortality for elk populations in northwest Wyoming. Regardless of the severity of winter weather, elk that attend feedgrounds experience only 1-2% mortality during the winter months. Feeding has led to productive herds and enabled local populations to be maintained at levels commensurate with summer habitats, but at levels larger than the native winter habitats could support.

It should be noted there is an estimated 7-12% loss in overall production for feedground elk as a result of abortions and births of non-viable calves due to brucellosis. However, this loss of calf production is offset by the higher over-winter calf survival that is a result of supplemental feeding. This point can be seen by comparing the five-year average calf production for two adjacent elk herds, one with brucellosis and the other without brucellosis. The West Green River elk herd, near Kemmerer, which is not supplementally fed and has shown only 1% seroprevalence of brucellosis, has 37 calves : 100 cows. The Piney elk herd, located immediately to the north, is supplementally fed with a brucellosis seroprevalence of 30%. Despite the loss of calves due to brucellosis, the five-year average calf production for the Piney elk herd is also 37 calves : 100 cows, presumably due to the lack of winter mortality.

Table 3 presents population trends and productivity ratios (calves : 100 cows) for all seven herd units with winter feeding programs. As of 2004, five of seven herd units exhibit a declining population trend, which is a direct result of hunting seasons the past several years. Liberal harvest has been necessary as calf elk production and survival has been good, indicating future recruitment of elk will be more than adequate to maintain these populations.

Table 3. Elk herd units and population trends, 1999-2003

	Population Estimates			Herd Unit	Post-Season Classification Ratios (Juveniles:100 Females)	
Herd Unit	**2003**	**1999-2003 Ave.**	**Trend**	**Objective**	**2003**	**1999-2003 Ave.**
Afton	2270	2620	Decrease	2200	34:100	33:100
Fall Creek	5450	4880	Increase	4392	41:100	33:100
Hoback	1080	1040	Stable	1100	40:100	37:100
Jackson	13730	15880	Decrease	11029	28:100	20:100
Pinedale	1950	2140	Decrease	1900	24:100	24:100
Piney	2840	2800	Decrease	2424	33:100	37:100
U. Green River	2150	2740	Decrease	2500	23:100	28:100

Disease

Artificial feeding of wildlife, be it birds or bison, is a two-edged sword. Most wildlife disease professionals consider artificial feeding a potential health threat to the fed animals due to the belief that prolonged congregation of animals around a feeding site increases the probability of disease transmission. This increased probability is generally irrespective of how the disease is transmitted, i.e., direct contact, aerosol, environmental contamination, or infected feces and urine.

Positive benefits of feeding include: increased winter survival, increased disease resistance (an increased plane of nutrition enhances the immune system), and increased production (less offspring lost *in utero* as a result of malnutrition).

The elk feedgrounds in northwest Wyoming encompass benefits and detriments. Following are examples of current and potential diseases that impact, or could impact, elk maintained on winter feedgrounds.

Brucellosis

Brucellosis is a highly contagious bacterial disease of both animals and humans recognized since the 19th century. Brucellosis is a disease of concern for wildlife, cattle, and humans. A Cooperative State-Federal Brucellosis Eradication Program has existed for over 70 years to eradicate brucellosis because of its economic impact on cattle and because it can be a serious human disease. This generally successful program has nearly eliminated brucellosis in domestic livestock, but the disease still exists in free-ranging elk and bison in the Greater Yellowstone Area (GYA) in the northwest portion of Wyoming and in adjacent portions of Idaho and Montana (see Figure 1). Brucellosis is not known to exist in wildlife at any other locations in these states.

Figure 1. Map of GYA

Brucellosis may have been introduced into the GYA from infected bison that were transplanted into Yellowstone National Park from a brucellosis-infected cattle ranch. In addition, elk may have contracted brucellosis when they fed on cattle feedlines in the early 1900s.

There are several *Brucella* species. *Brucella abortus* is the bacterium that infects elk, bison, and cattle. The current taxonomic scheme recognizes 8 biovars. *B. abortus* types 1 and 4 are probably the most common isolates from elk and bison in the GYA.

Infection of the female reproductive tract results in abortion. Cows usually abort their first calf following infection. A few cows will continue to abort their second, or even third, calf. Fetuses delivered near term often are stillborn or fail to thrive due to an overwhelming *Brucella* infection. The male reproductive tract (testes, seminal vesicles, prostate) can also be infected. Infection of the bone or joint membranes results in lameness that may make the animal more susceptible to predation.

The most common route of transmission is thought to be oral as a result of an animal licking or ingesting infected fetuses, placentae, fetal fluids, or vaginal exudates. Under cool, moist conditions, *Brucella* bacteria can persist for more than 100 days in the environment and transmission may occur by animals grazing on contaminated pasture or consuming other feedstuffs contaminated by discharges or fetal membranes. Treatment of brucellosis in animals

is generally unsatisfactory because it requires multiple drugs administered daily for several weeks.

The Game and Fish Department vaccinates elk against brucellosis on 21 of its 22 feedgrounds. The Dell Creek feedground is maintained as an unvaccinated control with which to compare efficacy of vaccination on other feedgrounds. A more thorough discussion of the Game and Fish Department elk vaccination program can be found under the section on the Brucellosis-Feedground-Habitat Program.

The Game and Fish Department tests elk for brucellosis at many of its feedgrounds. It also gathers blood samples from hunter-killed elk, which are thought not to winter regularly on feedgrounds. Seroprevalence data collected from 12 feedgrounds where elk have been vaccinated averaged 23.6% (range: 13-30%); the average seroprevalence of elk from the unvaccinated Dell Creek feedground has been 32%. The seroprevalence of elk not frequenting feedgrounds has averaged 2.3%. These data support the contention that feedgrounds increase the probability of disease transmission. Conversely, feedgrounds provide the only opportunity to effectively vaccinate elk and are one of the best methods to prevent co-mingling of elk and livestock during winter months.

Chronic Wasting Disease

Chronic wasting disease (CWD) is a fatal disease of the central nervous system of mule deer, white-tailed deer, and Rocky Mountain elk. Chronic wasting disease has been found in primarily central and southeastern Wyoming (see Figure 2). Chronic wasting disease is one of a group of diseases called transmissible spongiform encephalopathies that are thought to be caused by abnormal proteins or "prions." These prions are unlike viruses or bacteria in that they contain no DNA and, thus, are not living organisms.

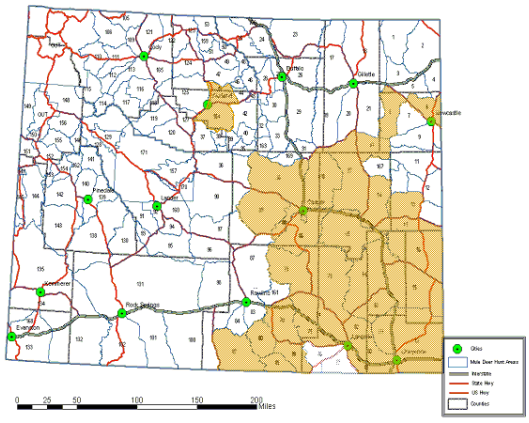

Figure 2. Deer Hunt Areas with CWD

Affected animals experience progressive loss of body condition, reluctance to move unless approached closely, increased drinking, depression, and eventually death. Many animals are seen near water and are reluctant to leave such areas. All animals showing clinical signs of CWD eventually die; however, it is not known if just being infected with the prion always results in disease and death.

The mode of transmission of CWD has not been identified. Evidence suggests the disease can pass directly from infected animal to uninfected animal; by contact with soil, plants, or feed contaminated with the prion; or by direct or indirect contact with the carcass of an animal that has died from CWD. There currently is no evidence that CWD can be transmitted to humans or domestic livestock.

The Game and Fish Department has conducted systematic surveillance for CWD since 1997 by examining hunter-killed deer and elk. Biologists remove lymph nodes from the head that are located just behind the curve of the jawbone. These lymph nodes are tested by an enzyme-linked immunosorbent assay (ELISA) test similar to one of the tests used for brucellosis. This test is highly accurate and can be conducted quickly. The overall CWD prevalence of deer found in the endemic area (shaded area on map) is 7.7% (range: 0.5-28.0%) whereas the prevalence for elk is 3.4% (range: 1.0-9.3%). It is unknown why more deer than elk are found to have the disease. Also, a higher percent of buck deer test positive for CWD compared to does; it is unknown if more bull elk get CWD than do cow elk. In addition, 1,095 elk from the Jackson herd have been tested since 1997 and none were found to be infected.

The prevalence of CWD in captive elk or deer has been found to be much higher (59-85%) than for free-ranging animals. This is thought to be due to an increased opportunity for animal-to-animal transmission and/or exposure to an increasingly contaminated environment. Mathematical models have been developed based on free-ranging and captive animal data. These models predict that over a period of several decades CWD prevalence rates will increase with a concomitant decrease in population. Some assumptions of this model have been called into question by scientists and, thus far, there is no proven example of a wild population declining due to CWD.

Many people are concerned that elk on feedgrounds may mimic the circumstances of elk in captivity and suggest that feedgrounds will result in high CWD prevalence resulting in drastic population declines as implicated by the disease models. Although this may happen, a perfectly acceptable alternative hypothesis is that CWD will have little or no impact on elk populations based on the known low prevalence rates for CWD in wild elk. Although there are many opinions, no one knows what will happen if elk on feedgrounds become infected with CWD.

The only tool wildlife managers have employed to slow the spread of CWD is increasing the hunter harvest or otherwise culling deer in a CWD area. This increased killing does result in decreased prevalence simply because decreased numbers of deer result in decreased opportunities for disease transmission. Nonetheless, all attempts at culling have only resulted in lower deer numbers. As of August 2004, culling has not stopped the spread of the disease. Many wildlife disease professionals believe that CWD cannot be stopped from spreading in the wild in the foreseeable future. If true, CWD will likely eventually infect elk in the GYA.

The only way humans have ever been able to control any disease is by developing a thorough understanding of the disease agent, the pathophysiology of the disease it causes, and its mode of transmission. Today, hundreds of research experiments are being conducted around the world to understand diseases like CWD. This research takes time, but eventually we will likely learn how to slow or stop the spread of CWD, how to protect animals from contracting CWD, or even how to cure animals already infected with the disease.

Tuberculosis

Tuberculosis (TB) is a worldwide disease affecting domestic and wild animals, birds, and humans. Tuberculosis is caused by bacteria of the genus *Mycobacterium*. Bovine TB, caused

by *Mycobacterium bovis*, is of most concern to elk and bison in the GYA. Tuberculosis causes lesions in the lungs and elsewhere, resulting in emaciation and oftentimes death. Infections can be unapparent for years.

Bovine TB is not presently found anywhere near the GYA, but there have been cases of TB in game farms in Montana and Colorado. Currently, there are focal areas of bovine TB in free-ranging white-tailed deer in Michigan and bison in Canada. Domestic cattle are capable of harboring TB and transmitting it to wildlife, but the disease has been nearly eradicated in cattle and is highly regulated to prevent its spread.

The disease is usually spread through inhalation of the bacteria by a susceptible host. High densities or artificial concentration of animals are thought to exacerbate the spread of TB. Although TB vaccines exist, none have been proven effective in preventing the disease in wildlife. Like brucellosis, individual animal treatment would be difficult in wild animals due to the need for long-term antibiotic treatment. Testing for TB in free-ranging animals is difficult because animals have to be held for three days to finish the testing process.

The WGFD has sampled 2,532 elk in the GYA since 1992 and found no cases of TB. Today, TB surveillance is conducted in conjunction with CWD sampling because the lymph nodes examined provide evidence of either disease.

Table 4. Jackson Elk Bovine TB/CWD Surveillance, 1992 - 2002

YEAR	SAMPLE SIZE	% OF TOTAL HARVEST
1992	120	3%
1993	312	12%
1994	302	7%
1995	260	8%
**1996	339 (*104)	11%
1997	310 (*243)	9%
1998	393 (*317)	19%
2000	262 (*197)	20%
2002	234 (*234)	10%
Total	2532 (*1095)	

*Number of CWD samples collected and tested.
**CWD surveillance started in 1996.

Prevention is the most rational management strategy for TB. This is being accomplished by continuous surveillance and examination of hunter-harvested wildlife. The nearly successful TB eradication program for cattle, and the recently implemented TB eradication program for farmed elk and deer, make it unlikely that TB will be introduced into wildlife of northwest Wyoming. Reduction or elimination of feedgrounds would not prevent the introduction of TB into the GYA, but feedgrounds could contribute to the maintenance and spread of TB should it arrive.

Other Diseases

There are other diseases to which elk are susceptible. Diseases such as pasteurellosis, necrotic stomatitis, and psoroptic mange (scabies) have been documented in elk both on and off feedgrounds. Pasteurellosis appears to be a function of animal densities, which cannot be reduced when animals are being fed. That is, the density (number of animals per given area) doesn't change greatly with the total number of animals being fed. Elk are somewhat resistant to this disease and outbreaks are sporadic and mortalities relatively low. Necrotic stomatitis, primarily a disease of feedground elk, has been managed by good feeding management, such as moving feedlines daily, feeding on clean snow, and using high quality forage. Scabies is a parasitic disease primarily of adult bull elk and its prevalence may be a function of animal condition; however, animals in good health and nutrition may be less susceptible to this parasite. High animal densities may exacerbate the parasite's spread. Feedgrounds both hinder (by providing good nutrition) and maintain (by increasing animal densities) this disease.

There are other North American and foreign diseases that are always a potential threat to the elk of the GYA. Paratuberculosis (Johne's disease), meningeal worm, anthrax, malignant catarrhal fever, and foot and mouth disease could be of serious concern to elk managers should they become endemic in the GYA.

Brucellosis and Livestock

The bacterium responsible for brucellosis was first isolated from cattle in the United States in 1910, and by 1934, 33 states had regulations requiring negative blood tests on imported cattle. Because of the widespread occurrence of bovine brucellosis in the U.S. and its importance as a disease of humans, the Cooperative State-Federal Brucellosis Eradication Program was initiated by an act of Congress in July 1934. In addition to costs of human health care associated with brucellosis, the disease was estimated to be costing the livestock industry $50 million annually.

The brucellosis eradication program is based on three components common to all disease eradication programs: 1) Surveillance to locate reservoirs of brucellosis; 2) Control to prevent spread of the disease; and 3) Eradication or elimination of all infected herds, individuals, and reservoirs. Surveillance techniques evolved and improved over time, and they are largely based on tests of milk or blood to detect antibodies against the causative organism. Control involves quarantine of infected and exposed animals and restrictions on movements of high risk animals. Vaccination is an important tool of control that reduces spread within affected herds and minimizes introduction of infection from outside a herd. Eradication has largely been based on test and slaughter of infected cattle. Depopulation is the preferred method in the late stages of an eradication program.

Cattle in Wyoming were certified as brucellosis free in 1985, culminating significant expense and effort on the part of Wyoming cattle producers and federal and state livestock health regulatory officials. Montana and Idaho cattle were certified brucellosis free in 1985 and 1990, respectively. Wyoming lost its brucellosis-free status in February 2004 because of a bovine brucellosis outbreak that was likely due to transmission from elk wintering on a feedground.

Currently, only Texas and Wyoming do not have brucellosis-free status. Nationwide costs of the eradication program have exceeded $4 billion, but savings once brucellosis is eradicated are expected to far exceed costs of eradication.

Wyoming and federal livestock health officials have identified seven occurrences of bovine brucellosis outbreaks they believe were transmitted from elk or bison in Wyoming since the early 1960s. Prior to the 1970s there was not a great deal of effort put into identifying sources of bovine brucellosis because the disease was relatively common in cattle. As the eradication program progressed in Wyoming, increasingly extensive efforts were made to identify sources of bovine brucellosis outbreaks, largely because of the importance of identifying all brucellosis-affected cattle herds. During the five-year period 1980-1984 there were three bovine brucellosis outbreaks attributed to elk and in the period 1985-1989 there were three additional outbreaks in cattle for which elk or bison were believed to be the likely sources.

The Parker Land and Cattle outbreak in Fremont County occurred in February 1989, after Wyoming was declared brucellosis-free. The Parker Land and Cattle brucellosis outbreak was identified and contained, and Wyoming did not lose its brucellosis-free status. However, this outbreak attracted considerable local and national attention and resulted in formation of a Governor's Brucellosis Task Force, the Greater Yellowstone Interagency Brucellosis Committee, two reviews of Wyoming's brucellosis eradication program by USDA/APHIS/Veterinary Services, and development of the Game and Fish Department's Brucellosis-Feedground-Habitat Program. There was no bovine brucellosis outbreak during the period from 1990 through 2002. A bovine brucellosis outbreak was discovered in Sublette County in November 2003. This was in a cattle herd that adjoined an elk feedground and is likely due to cattle contact during winter with reproductive products from a brucellosis-infected elk from the feedground during the winter of 2002-03 or 2001-02. In June of 2004, a single cow from another cattle herd, in Teton County, was confirmed positive for brucellosis. In July of 2004, one more cattle herd, in Campbell County, was confirmed positive for brucellosis. To date, this cattle herd is not known to have a history of co-mingling with elk or bison in the Greater Yellowstone Area.

The 2003 Sublette County bovine brucellosis did spread to a second cattle herd; and, according to rules of the eradication program, Wyoming lost its brucellosis-free status in February 2004. This loss of brucellosis-free status has impacts on the livestock industry throughout Wyoming and the nation. Marketability of cattle in Wyoming is negatively impacted, and there will be a continuing focus on the cattle industry of the Greater Yellowstone Area by other states and brucellosis-free countries.

Under the rules of the brucellosis eradication program, the status of Wyoming's cattle was down-graded from Free to Class A, which has certain requirements that affect all cattle producers in Wyoming. All test-eligible cattle must be tested and demonstrated to be free of brucellosis within 30 days prior to interstate movement or change of ownership. This may cost $3-10 per head, which is a significant added cost to producers. Because of the reservoir of brucellosis in elk and bison of the GYA, producers in Wyoming, Idaho, and Montana will continue to have to vaccinate their cattle and participate in surveillance programs indefinitely. These activities are expensive for producers and are not necessary in states where there is no reservoir of brucellosis.

The 2004 Sublette County bovine brucellosis outbreak demonstrated the risk to cattle associated with proximity to elk feedgrounds. There also are risks to cattle if elk traveling to or from feedgrounds must pass within proximity of cattle, especially in spring, when infected elk are likely to abort. On the other hand, elk feedgrounds are an important tool available in the effort to eradicate brucellosis from elk. Elk on feedgrounds are trapped and tested for antibodies against *Brucella abortus*, allowing the Game and Fish Department to monitor the prevalence of brucellosis and progress of the Brucellosis-Feedground-Habitat Program. In addition, feedgrounds play an important role in reducing co-mingling of elk and cattle, thereby lowering the risk of transmission of brucellosis to cattle. Presence of elk on feedgrounds provides accessibility to elk to vaccinate them against brucellosis, thus reducing transmission of brucellosis among elk and the risk of transmission to cattle.

Brucellosis–Feedground–Habitat (BFH) Program

The Wyoming Game and Fish Department developed an integrated program in an attempt to control brucellosis in free-ranging elk associated with feedgrounds in the late 1980s. This integrated approach, called the Brucellosis-Feedground-Habitat (BFH) Program, combines ongoing Game and Fish Department programs (feedground elk vaccination, feedground management, habitat enhancement, elk/cattle separation, education) with the goal of eliminating brucellosis in elk and keeping elk and cattle separated during potential brucellosis transmission periods. This BFH program is currently staffed with one permanent and three contract biologists. Staff support for several of the BFH program activities comes from inter- and intra-agency personnel. Additional support for the program comes from the USDA Animal and Plant Health Inspection Service (APHIS), and the Greater Yellowstone Interagency Brucellosis Committee (GYIBC) provides some technical and policy advice.

Elk Vaccination

The Game and Fish Department began vaccinating elk using remote delivery biobullet technology in 1985 at the Greys River Feedground. The Game and Fish Department currently vaccinates elk against brucellosis on 21 of its 22 feedgrounds while maintaining the Dell Creek feedground as an unvaccinated control with which to compare vaccine efficacy.

Vaccination is typically conducted on feedgrounds in January and February, after elk counts have been performed to estimate populations. Feedground operators and/or BFH personnel deliver biobullets from hay sleds, while also marking animals on one side with oil-based paintball markers to make sure animals only receive one dose.

During the first two years of a previously non-vaccinated feedground, or a feedground where adequate coverage has not been achieved in the recent past, all calves and all females are vaccinated. Calfhood vaccination only occurs after this period. Nearly 62,000 doses of vaccine have been administered using these technologies since 1985 (Table 5).

Elk are vaccinated with the strain 19 vaccine, a modified living bacterium that is less pathogenic than *Brucella abortus* (also referred to as "field strains"). The vaccinated elk is transiently

infected with strain 19, which stimulates the immune system to ward off the most deleterious effects of actual infection caused by the more virulent field strain.

The biobullet is fired from an air-powered rifle capable of accurately administering the vaccine at distances of up to 150 feet. The bio-bullet and its contents completely dissolve in the muscle tissue within several hours of implantation.

In controlled studies, *Brucella abortus* strain 19 vaccination was shown to reduce abortion rates in elk (Thorne et al., 1981). Research has demonstrated that the newer strain RB51, the preferred vaccine for cattle, provides no protection against abortion in elk, even when administered more than once.

The strain 19 vaccine is designed to prevent abortion, but not infection by field strain *Brucella*. Thus, vaccinated elk may contact and become infected by *Brucella abortus*, but not abort their calves. Strain 19 protects about 30% of the elk (about the same as for cattle) from abortion, which is the desired goal of vaccination in order to prevent disease transmission. Even though the strain 19 vaccine is not 100% effective, vaccinating all the calves over several years develops a "herd immunity", which is effectively higher than a single year's 30% efficacy.

Table 5. Wyoming elk feedground vaccination summary

	1985-2004 Strain 19 Vacination Summary	
Feedground	**Year Initiated**	**Total Doses**
Alkali	1991	2453
Bench Corral	1997	1768
Black Butte	1989	3343
Camp Creek	1989	3933
Dell Creek*	----	0
Dog Creek	1990	4127
Fall Creek	1994	2700
Finnegan	1996	903
Fish Creek	1993	1598
Forest Park	1988	4066
Franz	1997	1228
Greys River	1985	5119
Patrol Cabin	1991	2174
Horse Creek	1989	5480
Jewett	1997	1917
McNeel	1992	2596
Muddy Creek	1995	1940
NER	1989-91, 03-04	5020
North Piney	1995	156
Scab Creek	1995	2553
Soda Lake	1992	1945
South Park	1990	4227
Upper G.R.	1986	2691
Totals		61937

* Dell Creek has never been vaccinated (control)

A presumptive diagnosis of brucellosis in wild animals can be made through a variety of serologic (blood serum) tests. It is "presumptive" because these tests only detect antibodies made by the animal when it becomes infected with the *Brucella* bacteria. The tests cannot determine if an animal is actually infected with bacteria and is capable of transmitting brucellosis. For example, *Brucella* can be cultured from only 25% of bison having antibodies to the organism. Because the vaccines comprise living bacteria, they also induce an antibody response.

Older tests could not distinguish between antibodies caused by vaccination and those caused by actual infection. Thus, seroprevalence data (the percent of animals testing positive in a given sample) measured by these older tests over-represented the number of animals actually infected with field strain *Brucella*. Today, the WGFD uses a validated serology test (competitive ELISA or cELISA) that does distinguish between antibodies induced by vaccination from those induced by actual exposure to the field strain bacteria. All seroprevalence data now reported by the WGFD are from tests conducted with the cELISA and presumably indicate the percent of animals exposed only to field strain *Brucella*.

Brucellosis Serology

The Game and Fish Department initiated brucellosis surveillance in elk on the Greys River Feedground and National Elk Refuge in 1971 to monitor the distribution and prevalence of the disease. Currently, Game and Fish personnel trap, bleed, and test elk on four to five feedgrounds annually. To date, 3,705 yearling and adult female elk trapped on 19 different feedgrounds have been tested. It is important to remember seropositivity only indicates the animal has been exposed to *Brucella* and has formed an antibody response, but does not determine presence (or infection) of *Brucella* within the animal.

Serologic data (Table 6) indicate *Brucella* seroprevalence averages 32.4% (+/- 13.9) on Dell Creek feedground, which serves as a control and has never been vaccinated, and has fluctuated from 8% in 2004 to 50% in 1999. All vaccinated feedgrounds combined average 23.6% (+/- 15.9), and vary from 0% at Greys River in 1994, to 59% at Greys River in 2004. A 2-tailed paired sample t-test reveals mean seroprevalence at Dell Creek compared with all vaccinated feedgrounds is not significant (P= 0.27).

However, due to the complexity of factors involved in brucellosis transmission and the high variance in seroprevalence among years and feedgrounds, direct comparisons of mean seroprevalence may not accurately assess strain 19 program efficacy. Additionally, prevalence comparisons between Dell Creek and vaccinated feedgrounds within years assumes all transmission factors are equal excepting protection afforded by strain 19 vaccine in prior years on vaccinated feedgrounds. Thus, these data indicate strain 19 vaccination may have influenced declines in seroprevalence on several feedgrounds assuming all transmission factors are equal with Dell Creek, but are to be interpreted with caution.

Table 6. 1993 – 2004 Brucellosis seroprevalence (%) by feedground as determined by 4 standard and cELISA tests.

Year	Dell Cr.*	NER	Dog Cr.	Horse Cr.	S. Park	F. Park	Alpine	Finnegan	Franz	Black B.	Upper GR	Fall Cr.	Muddy Cr.
1993							11					29	
1994							0					15	
1995							13						37
1996			13				9						24
1997		13	33				3						
1998	26	15	43				14						
1999	50	13					9						
2000	45			19			26			9			
2001	26	7				26	54	18					
2002	35	18				33	50						
2003	37	17			26		51		37		15		
2004	8	20					59						27
Mean	32.4	14.7	29.7	19.0	26.0	29.5	24.9	18.0	37.0	9.0	15.0	22.0	29.3

*Dell Creek Feedground is a control; elk have not been vaccinated on this feedground

Elk/Cattle Separation

Preventing elk from establishing feeding patterns in cattle wintering areas greatly decreases the potential for brucellosis transmission to cattle. Each year, Game and Fish Department personnel employ a variety of techniques designed to keep elk and cattle separated. Techniques used include: 1) feedgrounds; 2) providing stackyard materials; 3) hazing elk; and 4) lethal take of elk.

The Game and Fish Department provides game-proof fencing to prevent elk from depredating stored hay crops. Since the inception of the BFH program in 1991, elk-proof fencing materials for 175 haystacks have been provided to cattle producers in three counties in western Wyoming.

In some situations elk are actually hazed away from hay crops using pyro techniques. Often elk have to be physically moved or herded from cattle feedlines, typically through the use of snowmobiles or helicopters. In more severe damage situations where elk cannot be readily moved to a proper wintering area, some elk are shot. Elk may be harvested by hunters through late season depredation hunts on private lands or in extreme cases, by Game and Fish personnel through the use of kill permits.

The amount of time spent implementing management actions varies with the severity of the winter, but the long-term trend would show a dramatic increase in such activities over the past 20 years. A review of Daily Activity Reports for Wildlife Division employees in the Jackson/Pinedale Region from fiscal year 2000 through fiscal year 2004, show a total of 6,067 person hours, or 758 person days, have been spent to prevent elk damage and elk/cattle co-mingling. This would equate to an average of 152 days/year.

Given the average daily cost (salary only) of $176 per game warden, this equates to $26,752 per year spent addressing elk damage. There are additional costs for equipment such as trucks, snowmobiles, and aircraft charter. The Game and Fish Department has spent between $1,000 and $10,000 in most years using helicopters to haze elk. Annual snowmobile operation costs routinely exceed $10,000. When conflict prevention efforts fail, emergency elk feeding has

been used to manage elk. This involves additional hay purchase, numerous additional days worked, hotel, and vehicle costs for persons from outside the region. Emergency feeding costs in 2003-04 exceeded $8,000.

These figures do not include considerable time spent by BFH and Habitat personnel who also contribute regularly to such activities. Also, this does not include other activities indirectly related to elk damage, such as processing damage claims, initiating feedgrounds, and administering Hunter Management Areas for hunts designed to alleviate elk damage.

It is important to note that the Department's considerable effort to manage damage conflicts and maintain elk and cattle separation occurs with an average of only 20% of the elk wintering away from feedgrounds. This workload frequently exceeds the workforce assigned to the region.

Given the combination of deep snow, present land ownership patterns, land use, and resource allocation, it is doubtful the Department could adequately address damage and separation issues with less elk feeding. If no circumstances changed, it would take a reduction in elk numbers or elimination of livestock use to eliminate feeding as a management tool.

Wolves create an additional feedground management dynamic (Werbelow, 2003). In early winter, wolves often disrupt feeding operations and increase the potential for elk damage and co-mingling with cattle. During spring, wolves may improve management by moving elk away from feedgrounds to spring transitional ranges.

In addition to winter activities, BFH personnel have been monitoring areas since 1999 where elk parturition and cattle turnout dates overlap. During the elk calving period, from late May to mid June, there is a potential risk for brucellosis transmission to cattle on overlapping ranges. Twenty public land grazing allotments in three counties have been identified as potential risk areas (See Fig. 3). Monitoring efforts to date have not revealed co-mingling in the majority of these allotments. Coordination and education efforts with land managers and grazing operators will be continued to resolve elk/cattle interaction if and when conflict areas are identified.

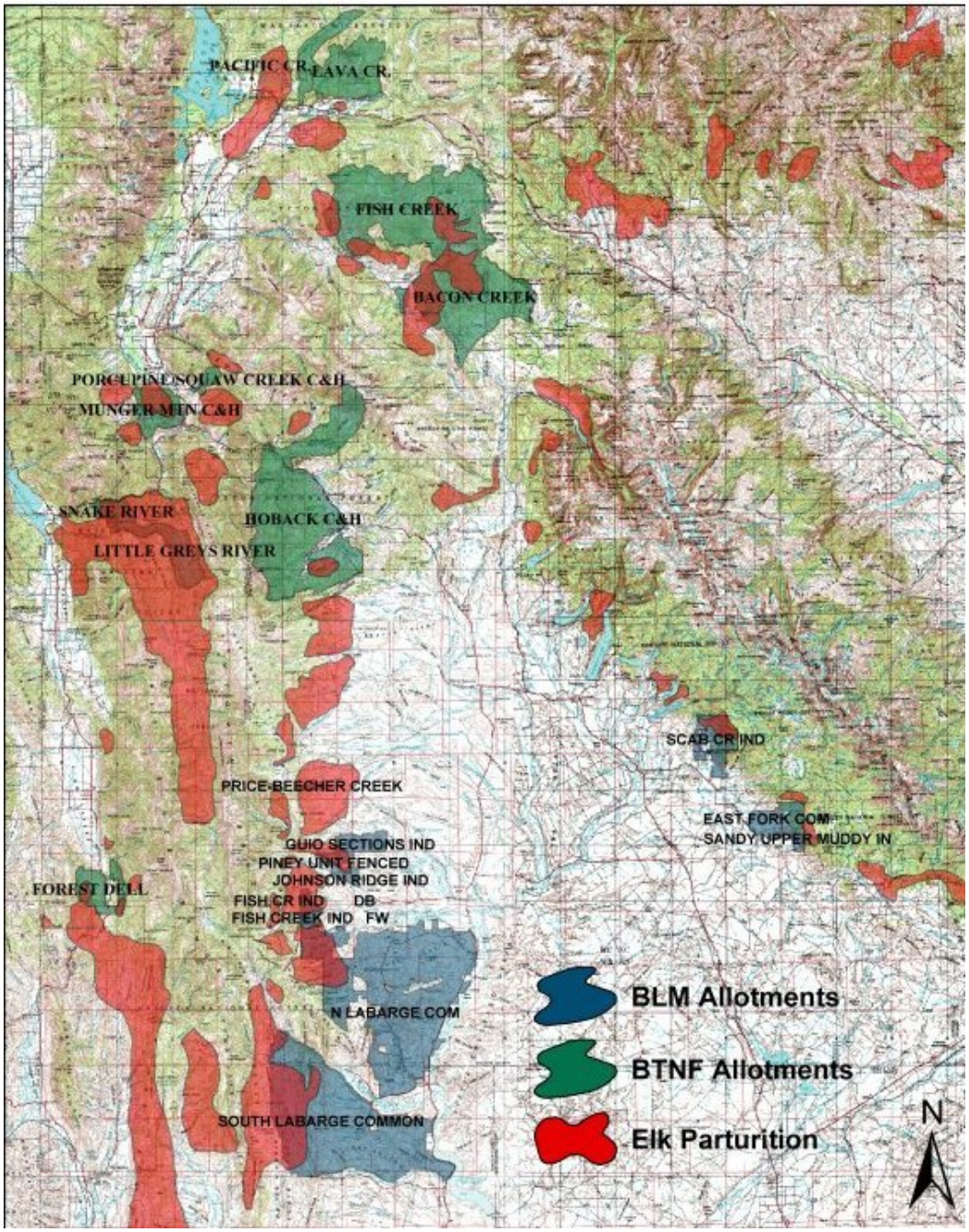

Fig. 3. Overlaps in elk parturition and public land grazing allotments where livestock grazing begins prior to June 15th

Habitat Enhancement

A variety of habitat enhancement techniques have been employed to manipulate vegetation and promote a more desirable assortment of plants or plant communities. These habitat enhancement techniques include prescribed fire, mechanical treatments, and herbicide application. Game and Fish Department BFH and Habitat biologists typically prefer to use prescribed burning as the

primary tool, as it most closely mimics natural disturbances and is the most cost effective enhancement method per acre.

Elk habitat and forage have been significantly modified through human control of wildfire. Fire suppression over the past century, along with a general reduction of ground cover by domestic livestock, have significantly reduced fire on the landscape (DeByle and Winokur, 1985; Baker, 1925). Fire has historically been responsible for creating a mosaic of diverse age classed vegetation for all habitat types throughout the mountain West and rejuvenating plant communities dependent upon disturbance. Ecotones between plant community successional stages produce a combination of forage and cover highly preferred by elk (Skovlin, 1982).

Forage within burned areas frequently possesses elevated nutritional values, especially crude protein and digestibility, for 5-10 years post-fire. Moreover, fire-induced changes in vegetation species composition generally benefit free-ranging ungulates and are long-term, lasting 25-100 years. Historically, approximately four percent of the landscape in the West was burned each year by wildfire. Less than one fourth of this amount has burned annually within the past several decades, leaving a disproportionate amount of the landscape in advanced successional stages. Human controlled (prescribed) fire is used to reintroduce fire to the landscape to promote a balance of diverse plant communities and age classes across the landscape.

Mechanical treatments are a tool used to improve habitat for elk and other wildlife. There are numerous mechanical devices that can be used to manipulate vegetation. Most include varieties of modified farm equipment designed to disturb the vegetative cover, setting back natural succession of plant communities. Pulling a disc, half-round drum, ripper, mower, or enormous chain behind a tractor are some techniques used to promote herbaceous production, species diversity, and reduce competitive plants in shrub, grass, and small tree vegetation types. Thinning and harvesting using chainsaws or the forward harvester (mechanical vehicle used to cut and move trees) can also be used as a vegetation management technique to rejuvenate stands, increase production, and eliminate undesirable species.

Herbicide application to reduce specific plants, while increasing the quantity and quality of other plants, can also help create diverse plant communities. The herbicide “Spike” can be used to reduce the density of sagebrush, promoting increased herbaceous production. Targeted application of various herbicides can also help control noxious weeds and reduce competition with more desirable and palatable natives.

Game and Fish Department personnel, with various partners, have treated over 67,000 acres of habitat over the last 12 years in the Jackson/Pinedale Region with the primary goal of enhancing the quality and quantity of elk ranges (See Figure 4). There are three BFH project biologists working in different geographic areas within the Jackson/Pinedale Region. These areas include the Pinedale, Big Piney, and Jackson BFH projects areas. Listed below are completed habitat treatments for each BFH project area.

Pinedale BFH Area Vegetation Treatment Summary

15 projects completed from 1993-2004

10 prescribed burns	= 12,860
2 herbicide (Spike)	= 620
3 mechanical (aspen cutting)	= 110
TOTAL	13,590

Piney BFH Area Vegetation Treatment Summary

13 projects completed from 1992-2004

3 mechanical (various)	= 4,476
5 prescribed burns	= 3,540
3 herbicide (Spike)	= 1,355
TOTAL	9,371

Jackson/Afton BFH Area Vegetation treatment Summary

28 projects completed from 1990-2004

23 prescribed burns	= 43,200
5 mechanical (mostly cutting)	= 1,100
TOTAL	44,300

Figure 4. Number and location of habitat enhancements and wildfires within the Jackson/Pinedale Region.

Habitat improvements to increase forage quality and quantity can reduce dependence on feedgrounds, in terms of days of use and/or amount of feed consumed, but their effectiveness is currently limited and quite variable for several reasons. Elk generally move to supplemental feed when native forage becomes limited due to ungulate consumption or snow depth, which varies from year to year. If the potential for damage on private lands exists, elk are either moved to adjacent feedgrounds and/or feeding is initiated early to attract elk away from potential damage/co-mingling conflicts. Thus, the need to prevent damage to stored crops and co-mingling of elk and livestock and variable winter conditions reduce the overall effectiveness of habitat improvement efforts.

Habitat improvements are an important part of the multi-faceted approach to managing brucellosis, and provide benefits to many wildlife species, but habitat improvements alone are not likely to solve the problem or allow phasing out of elk feedgrounds. However, habitat improvements in conjunction with other management actions such as conservation easements, land acquisitions, and forage allocations for wintering elk on public lands may allow phasing out certain feedgrounds.

Information and Education

Game and Fish Department personnel regularly inform and educate various public factions about wildlife diseases, including brucellosis and chronic wasting disease. Educational outreach efforts have included multi-agency symposiums, group presentations, videos, news releases, interpretive signs at feedgrounds and crucial winter ranges, and a number of brochures and publications. The importance of quality wildlife habitat and the significant role fire plays in natural ecosystems is also stressed throughout these efforts. Game and Fish Department field personnel make numerous contacts with private landowners regarding habitat improvement projects, wildlife-friendly management techniques, or ways to prevent co-mingling of elk and livestock. Additional efforts are focused on youth education at events such as the Game and Fish Department's annual Youth Conservation Camp at Dubois and the annual Hunting and Fishing Expo in Casper to inform kids, and their parents, on the vaccination program and brucellosis management.

The BFH program is an effective integrated management approach addressing brucellosis and elk management. Surveillance has indicated remote delivery of strain 19 vaccine has reduced opportunities for brucellosis transmission in elk through enhanced immunity. Techniques employed to maintain elk/cattle spatial and temporal separation have been effective. Thousands of acres of habitat enhancement projects coupled with modified feedground management practices have maximized elk use of spring and fall habitats, potentially decreasing the average time elk occupy feedgrounds and the associated density dependent rate of disease transmission. These enhancements have also benefited numerous other wildlife species and have restored ecosystems to a more properly functioning condition.

Although the BFH approach has demonstrated its effectiveness in reducing opportunities for brucellosis transmission and reducing elk/cattle conflicts while enhancing habitat for numerous wildlife species, this approach alone will not likely eradicate the disease from the GYA. However, until a more efficacious vaccine is developed and/or the various elk/livestock/habitat conflicts are resolved, the BFH program may be the only practical approach currently available to control brucellosis in elk at a manageable level.

Interagency Coordination

Brucellosis and elk feedgrounds have a long history in Wyoming. Brucellosis was probably introduced as an exotic disease of elk around 1900 and elk have been fed since 1910. Although brucellosis was known to be present in elk and bison of the GYA in 1934, when the Cooperative State-Federal Brucellosis Eradication Program was adopted, little or no thought was given to its presence in wildlife and future problems it would eventually present to complete eradication of the disease. Brucellosis and wildlife related issues in the 1960s and 1970s were largely focused on bison of Yellowstone National Park.

Brucellosis was first identified in elk in 1930 at the National Elk Refuge and at Greys River Feedground in the 1940s. The scope of brucellosis in elk as a problem began to be recognized in the 1970s when the Game and Fish Department began testing large numbers of elk for antibodies

against *Brucella abortus* at Greys River Feedground, the National Elk Refuge, and other elk feedgrounds. Also during the 1970s, livestock health officials dealt with persistent brucellosis problems in a herd of cattle adjacent to the Greys River Feedground. The Game and Fish Department began controlled research on brucellosis in elk at the Sybille Wildlife Research and Conservation Education Center in 1971-72.

By the late 1970s, research at Sybille and testing on elk feedgrounds demonstrated brucellosis was an important disease in elk, causing approximately 50 percent of infected females to abort their first calf following infection. Brucellosis was present on all elk feedgrounds and research into the possibility of vaccinating elk against brucellosis was appropriate. By 1985, the Game and Fish Department, with concurrence of USDA/APHIS/Veterinary Services, concluded Strain 19 vaccine was safe in elk and about as effective in elk as it is in cattle at preventing abortion when a vaccinated elk becomes infected.

In 1985, the same year Wyoming's cattle were declared free of brucellosis, the Game and Fish Department initiated vaccination of feedground elk with a ballistic bio-bullet system on a trial basis at Greys River Feedground. During this time, increasing regional and national attention was being paid to brucellosis in elk and bison of the GYA. In order to encourage inter-agency communication, the Tri-State Brucellosis Technical Committee was formed in 1988 and held its first meeting in October in conjunction with a meeting of the U.S. Animal Health Association. The Technical Committee met one or two times a year, but it had no authority and served only to establish dialogue and understanding among agencies and parties.

In response to the Parker Land and Cattle bovine brucellosis outbreak, Wyoming Governor Mike Sullivan established the Wyoming Brucellosis Task Force in May 1989. The Task Force established a goal to "Protect the integrity of Wyoming's free-ranging bison and elk populations and livestock industry by eradicating wildlife brucellosis by the year 2010." The Task Force recognized a number of problems stood in the way of achieving this goal and that the brucellosis problem involved all the GYA, not just Wyoming. And, it recognized cooperation and coordination of all state and federal wildlife management, land management, and livestock health agencies, along with stock grower and conservation organizations, in the three affected states was needed to eliminate brucellosis in wildlife in the GYA. The Task Force made numerous recommendations, many of which have been implemented, while others have not been accomplished. A key recommendation was to establish a multi-agency, tri-state brucellosis committee to address brucellosis in wildlife in the GYA.

In 1995, an MOU establishing the Greater Yellowstone Interagency Brucellosis Committee (GYIBC) was signed by the Governors of Wyoming, Montana, and Idaho and the Secretaries of Agriculture and Interior. The MOU contained a goal, mission, and ten objectives that would guide the GYIBC in its activities. With establishment of GYIBC, the Tri-State Brucellosis Technical Committee was disbanded. The GYIBC has established and maintained communications, understanding, dialogue, and cooperation among member agencies that was not previously possible. The GYIBC has sponsored two symposiums on brucellosis in the GYA, written an informative white paper on brucellosis, adopted a resolution recommending against new feedgrounds in the GYA, prepared an Information and Education Plan for Citizen Participation and a video on brucellosis in GYA, and written technical reports on male

transmission of brucellosis, brucellosis in horses, vaccine safety and efficacy, a bison quarantine protocol, etc. The GYIBC's commitment to respect and honor mandates and responsibilities of member agencies prevents unilateral initiation of management actions, which has led many people to conclude it "moves with glacial speed."

In response to the November 2003 bovine brucellosis outbreak in Sublette County and loss of Wyoming's brucellosis-free status in February 2004, Governor Dave Freudenthal established the Wyoming Brucellosis Coordination Team. It is charged to develop best management practices and specific recommendations related to four topics: 1) Reclaim Wyoming's brucellosis-free status and improve surveillance in cattle and work to end transmission between cattle and wildlife; 2) Develop a road map of what to do in the event of a new brucellosis outbreak in cattle; 3) Address human health concerns associated with brucellosis; and 4) Reduce, and eventually eliminate, brucellosis in wildlife. Four committees were formed to address these topics: 1) Human health issues; 2) Cattle issues; 3) Regulatory issues; and 4) Wildlife issues. The Brucellosis Coordination Team has established an ambitious meeting schedule and intends to present its report and final recommendations to the Governor in late 2004, in time to prepare legislation for the 2005 legislative session, if necessary.

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Appendix 3

WYOMING GAME AND FISH DEPARTMENT
CHRONIC WASTING DISEASE MANAGEMENT PLAN
February 17, 2006

EXECUTIVE SUMMARY

- It is the purpose of this plan to provide flexible and adaptable direction for management of Chronic Wasting Disease (CWD) in mule deer (Odocoileus hemionus), white-tailed deer (Odocoileus virginianus), elk (Cervus elaphus) and moose (Alces alces).
- The plan will be reviewed and updated as the CWD situation in Wyoming changes and additional information becomes available.
- The plan consists of four components: Disease Management, Applied Research, Public Information and Funding.
- Based upon the known epidemiology of CWD in free-ranging deer, elk and moose, eradication is currently not a realistic disease management objective.
- The Wyoming Game & Fish Department (WGFD) will work to minimize the spread of CWD and coordinate CWD management with other state, federal and tribal agencies.
- The WGFD will conduct surveillance to determine spatial distribution and prevalence of CWD, and coordinate CWD research with other state, federal and tribal agencies.
- The WGFD will provide timely, complete, and accurate information about CWD.
- Although there are concerns or perceptions by some people that CWD could be a livestock or human health threat, there currently is no credible supporting evidence of such a threat; consequently, this plan addresses CWD as a disease of deer, elk and moose.
- The WGFD will continue to work cooperatively with the Wyoming Department of Health and other human health organizations worldwide to monitor current research on CWD and human health and to provide up-to-date information to the public.
- Many very expensive CWD management, research, and public outreach activities are driven by the consideration of CWD as an international disease of concern; therefore, federal funding is appropriate for implementation of this plan.

INTRODUCTION

Chronic wasting disease is a transmissible spongiform encephalopathy (TSE) of deer, elk and moose that may constitute a health threat to mule deer, white-tailed deer, elk and moose populations in Wyoming and elsewhere. CWD is a wildlife disease that has generated tremendous concern, both in Wyoming and throughout North America. The CWD zone in Wyoming is currently defined as those hunt areas where CWD has been found. The CWD Zone, as presented on the WGFD web site (http://gf.state.wy.us), will be continually updated as new information becomes available. The WGFD is responsible for managing Wyoming's wildlife. Management of disease in wildlife is an important responsibility of the WGFD. It is the purpose of this plan to provide flexible and adaptable direction for management of CWD in Wyoming. The plan will be reviewed and updated as the CWD situation in Wyoming changes and additional information becomes available. The plan consists of four components:

I. Disease Management
II. Applied Research

III. Public Information
IV. Funding

COMPONENT I. DISEASE MANAGEMENT

Based upon the current scientific information about CWD in free-ranging deer, elk and moose, eradication is not a realistic disease management objective. Through adoption of this plan, Wyoming has chosen an adaptive management strategy allowing flexibility to alter disease management activities depending on future research results. Currently, the Disease Management component addresses 11 objectives. The WGFD will use the best scientific information available and will take necessary and reasonable steps to achieve these objectives:

1. Manage Dispersal of CWD.

A. Management of New Foci of CWD

Surveillance data indicate that animals infected with CWD are not distributed evenly. Rather, infected animals are often found in groups or clusters. Currently, there is no management action proven to prevent the spread of CWD once established. However, CWD experts have suggested that aggressively culling animals near a newly discovered cluster is a worthwhile management exercise with three main goals. The first goal is to possibly eliminate new infection in a localized area. The second goal is to reduce the prevalence in the new area and slow the spread of the disease. The third goal is to determine prevalence in the immediate area of a new case. Future management actions, if any, would be based on this determined prevalence. Management of CWD will have to be adaptive in nature. In other words, the WGFD will try some management actions and assess the results. These results will determine subsequent management actions.

If a positive animal is found in a hunt area with a low incidence rate or a new hunt area, WGFD personnel will make a decision as to what management actions to take based on the location of the positive animal relative to the CWD zone. If warranted and appropriate, the WGFD will implement the following management actions intended to prevent dispersal of CWD.

Hunter surveillance in the area will be intensified. If hunter samples are unavailable, if warranted and feasible the WGFD will attempt to collect and test up to 50 cervids in a five-mile radius of the index case. For each subsequent cervid that tests positive for CWD, if warranted and feasible the WGFD will attempt to collect and test up to 50 cervids in a five-mile radius of the positive animal. The results of these collections will determine subsequent management actions.

B. Management of CWD via movement of carcasses.

There is a concern that CWD may be moved to new areas by the transport of certain animal parts. To minimize this possibility, the Wyoming Game and Fish Commission (WGFC) regulates what harvested animals and animal parts may be transported from the

CWD zone to other parts of the state or out of the state. Likewise, the WGFC prohibits the importation of animals or animal parts taken from any state, province or country within areas designated by the appropriate jurisdictional agency as positive for CWD in deer, elk or moose.

C. Restrict translocation of deer, elk and moose.

Live deer, elk and moose from the wild will not be moved to other locations within the state without review and prior approval by the WGFD.

2. Remove deer, elk and moose suspected of being affected by CWD.

Removal of deer, elk and moose displaying symptoms of CWD may reduce spread of CWD and will contribute to statewide targeted surveillance and provide necropsy and/or research material. When and where possible WGFD personnel will lethally take and necropsy all animals suspected of having CWD.

3. Discourage private feeding of deer, elk and moose.

Based on experience with captive deer and elk, there is evidence that CWD is more efficiently transmitted when animals are concentrated. Private feeding may lead to localized concentrations of environmental contamination with the CWD agent. The WGFD will seek legislation prohibiting intentional private feeding of big game animals, including deer, elk and moose and will continue to educate the public on the unintended consequences of intentional private feeding through television, press releases, radio, presentations to the public and personal contacts.

4. Appropriate WGFD personnel will participate in intra- and interdepartmental, intra- and interstate CWD coordination meetings.

Sharing research results and coordination among state, federal and tribal agencies is important in the management of CWD. WGFD administrators, managers, veterinarians, and researchers will participate in appropriate meetings on CWD. Information will be shared with WGFD personnel. The WGFD will coordinate and collaborate with state, federal and tribal agencies on all relevant CWD management issues.

5. Maintain the ban on statutory prohibition of captive deer, elk and moose ownership and facilities in Wyoming and the effectiveness of the WGFC Chapter 10 regulation.

WGFC Chapter 10 Regulation, “Regulation for Importation, Possession, Confinement, Transportation, Sale and Disposition of Live Wildlife,” addresses CWD in relation to the only privately owned elk facility permitted in Wyoming by statute. Any captive cervid imported into Wyoming must originate from facilities certified to be free of CWD for the five years previous to the requested date of importation. This restriction is intended to prevent spread of CWD. There are no other captive, privately owned deer, elk or moose within Wyoming. Future establishment of captive, commercial native cervid facilities in Wyoming is prohibited by statute.

6. Hunting will continue to be the primary management tool for management of CWD in deer, elk and moose.

The flexibility inherent in Wyoming's hunting regulations allows the WGFD to modify seasons to meet specific needs. This flexibility, combined with the long and rich hunting heritage the State of Wyoming enjoys, makes the use of hunter harvest the preferred tool in managing CWD.

Testing of deer, elk and moose provides two primary benefits. First, testing provides critical data for management and research. Second, when the hunter provides a sample and accurate and legible contact information, testing allows a hunter to choose whether or not to consume an animal that has tested positive for CWD. Both of these are important, yet distinct, benefits.

Hunters who participate in the WGFD's CWD surveillance program by providing deer, elk or moose samples for this research and who provide adequate information, can obtain test results through the WGFD's web site (http://gf.state.wy.us/services/education/cwd). If a sample submitted to the WGFD's CWD surveillance program tests positive and adequate contact information is provided, the hunter will be notified of the positive test result via mail.

Other than the WGFD surveillance program, WGFD will not be responsible for the testing of individual hunter's animals. The WGFD will provide information regarding public testing facility locations and costs for hunters who choose to have their animals individually tested at their own expense. If hunters wish to have their results handled individually, they may submit their sample to the Wyoming State Veterinary Diagnostic Laboratory in Laramie for a fee.

The WGFD may donate deer, elk and moose carcasses acquired from the CWD zone to individuals after the animal has been tested with no evidence of CWD being found and the recipient signs an affidavit of informed consent. The WGFD will not donate meat from deer, elk and moose killed within the CWD zone to organizations or entities for redistribution. The WGFD cannot, however, guarantee that no risk exists relative to human consumption of deer, elk and moose.

The State of Wyoming does not guarantee the meat quality of wild animals; therefore, the WGFD will not re-issue a hunting license, issue a refund for any deer, elk or moose license, nor reimburse for processing charges if an animal tests positive for CWD. Hunting licenses provide the holder the opportunity to pursue and take an animal in accordance with state statutes and WGFC regulations. A hunting license is not a guarantee or bill of sale for edible meat.

7. Use WGFD targeted and/or hunter-killed surveillance to identify new foci of CWD.

Surveillance using WGFD targeted and/or random, hunter-harvest methods will be conducted outside the CWD zone to identify any new focus of CWD. A new focus of infection will be considered a location outside the zone where one or more test-positive deer, elk or moose are located.

8. Consideration will be given to efforts to reduce prevalence of CWD.

Large-scale culling to reduce prevalence of CWD could have more severe effects on deer, elk and moose populations than CWD. When and where possible and appropriate, the WGFD will implement management actions intended to reduce or stabilize the prevalence of CWD.

9. Feedgrounds.

Elk have been fed in northwest Wyoming since the early 1900s. Originally, elk feedgrounds were designed to mitigate loss of winter range, reduce human/elk conflicts and maintain a traditional population of elk. More recently, elk feedgrounds have continued to address those issues as well as facilitating separation of elk and cattle to prevent the potential spread of brucellosis. Elk feedgrounds are a complex biological, social, economic and political issue. Wildlife disease adds to this complexity. There has been increased concern CWD will eventually infect elk frequenting the state and federal elk feedgrounds in Lincoln, Sublette and Teton Counties in northwestern Wyoming. Although the prevalence of CWD in free-ranging elk is only 2-3% (approximately an order of magnitude less than that found in deer), the cumulative prevalence of CWD in captive elk has been higher. Elk densities on feedgrounds may result in prevalence levels found in captive elk. It is unknown at this time what impact prevalence's exceeding 2 – 3% will have on free ranging populations. This does not imply that deer, elk and moose in northwestern Wyoming are more important than deer, elk and moose in the rest of the state, only that they may be more at risk due to winter concentration of elk on feedgrounds.

It should be noted that the prevailing opinion of professionals experienced with CWD epidemiology and current methods available to control this disease in the wild is that the spread of CWD, at best, can be slowed but not prevented. With this in mind, the WGFD will implement the following actions for managing CWD, in the event it occurs, in elk herd units E-102, Jackson; E103, Fall Creek; E104, Hoback; E105, Afton; E106, Piney; E107, Green River; and E108, Pinedale; in Lincoln, Sublette and Teton Counties.

A. Intervention

The best way to deal with the concern of CWD reaching feedgrounds is to establish proactive measures elsewhere in the state in an attempt to slow the spread of the disease. If warranted and feasible, the WGFD will deal with any new foci of CWD that is discovered. Management actions outlined in Section 1 of the Disease Management portion of this plan will be implemented in an effort to eradicate CWD from the new area or substantially slow the spread of the disease before it reaches Teton, Sublette or Lincoln Counties.

B. Surveillance

There are two types of CWD surveillance: targeted and hunter harvest. Targeted surveillance is the harvesting and testing of any cervid displaying symptoms consistent with clinical CWD. This surveillance method occasionally detects CWD cases in new areas. Hunter harvest surveillance is a systematic sampling and testing of deer, elk and moose harvested by hunters. This method provides potentially large numbers of samples representing broad geographical areas. Hunter harvest surveillance is a valuable tool for determining disease prevalence as well as finding cases in new geographical areas.

The WGFD will continue to emphasize having its personnel and contract elk feeders look for, remove and sample deer, elk or moose exhibiting signs consistent with CWD. In addition, the WGFD will continue its public information program asking the public to report sick deer, elk and moose to aid in CWD monitoring efforts. Harvesting such animals may identify a new case of CWD and, in doing so will result in the removal of a potential source of infection and decrease the probability of transmission.

Hunter harvest surveillance for cervids will be expanded in NW Wyoming. When possible, elk that die or are killed on any of the 22 WGFD feedgrounds will be tested for CWD. Deer, elk and moose samples will be collected and tested for CWD by WGFD personnel when an opportunity to collect such samples is available during and outside the regular CWD surveillance program in Teton, Sublette and Lincoln Counties. The WGFD will attempt to sample, in two-year intervals, at a level sufficient to have a 95% probability of detecting CWD at 1% prevalence.

C. Feedground Management

If CWD is detected in elk inhabiting state feedgrounds, WGFD personnel will monitor the population intensively and remove any elk showing clinical signs of CWD. The WGFD will attempt to: 1) maximize the area of feeding to decrease animal-to-animal contact; 2) decrease days of feeding to disperse the elk; 3) take any other actions to decrease elk concentration provided such actions are consistent with other necessary wildlife management and feedground practices. Large-scale culling of elk is not anticipated.

The WGFD will communicate and coordinate with the U. S. Fish and Wildlife Service's National Elk Refuge on strategies for surveillance and management of CWD on the National Elk Refuge.

COMPONENT II. APPLIED RESEARCH

Management of CWD will require a more thorough understanding of the disease, how it is spread among cervids, how it affects cervid population dynamics, the relationship between CWD, bovine spongiform encephalopathy (BSE), scrapie and other transmissible spongiform encephalopathies, whether the disease has the capability to penetrate species barriers and other critical components.

The WGFD will support and conduct, on a priority basis, applied research that will facilitate continued expansion of knowledge of CWD. The WGFD will continue monitoring research that is occurring throughout the world on CWD and TSE to ensure the WGFD has the most current and comprehensive data and scientific information available.

In addition to involvement in ongoing collaborative CWD research, the WGFD, in cooperation with the Wyoming Wildlife/Livestock Disease Research Partnership, has identified research priorities and will seek funding to initiate these studies, which may be conducted in collaboration with other researchers. A mechanism has been established, through the Wyoming Wildlife/Livestock Disease Research Partnership, so money specified for CWD research can be

received, matched, and used for collaborative research. The current Applied Research component includes:

1. Determine spatial distribution of CWD in Wyoming.

The WGFD has been monitoring CWD since 1983 using targeted surveillance and hunter harvested game animals to determine distribution and prevalence. Ongoing surveillance will be integrated with expanded studies using GIS technology and intensive sampling to monitor the distribution and prevalence of CWD in Wyoming. Hunter-harvest and/or targeted surveillance statewide will be planned yearly to better define boundaries of the CWD zone and identify new focus areas.

2. Dynamics of CWD in free-ranging white-tailed deer.

The WGFD is financially and materially supporting a multi-year study of the epidemiology of CWD in white-tailed deer. For a variety of reasons, white-tailed deer may be more susceptible to CWD. Movement patterns of white-tailed deer from the CWD zone are being monitored using telemetry. Telemetry will also provide data on survival and, thus, potential impact on the population. These data would be used to estimate the risk of CWD moving into new areas via white-tailed deer, to evaluate the need for different management strategies in mule deer and white-tailed deer and to evaluate strategies to prevent spread of CWD.

3. Appropriate WGFD personnel will participate in intra- and interdepartmental, intra- and interstate CWD research meetings.

Sharing research results among state, federal and tribal agencies is important in understanding and management of CWD. WGFD administrators, managers, veterinarians and researchers will participate in appropriate meetings on CWD. Research information will be prioritized, shared and, where practicable, incorporated into CWD plans.

4. Experimental CWD infection of moose.

The WGFD is conducting research at the Sybille Wildlife Research Unit to assess the susceptibility of moose to CWD infection and to document the pathogenesis of this disease in moose.

5. Predicted population effects on free-ranging elk based on captive elk chronically exposed to the CWD prion.

Forty-three female elk calves were trapped at the National Elk Refuge and transported to Sybille in February 2002. Elk were housed in pens, assumed to be environmentally contaminated with the CWD prion. Elk will be held throughout their lifetimes. Elk dying will be examined and cause of death determined. From these data, it will should be possible to model free-ranging elk mortality and population dynamics under extreme circumstances of CWD prion exposure and transmission. As of December 2005 (46 months post capture), 11 of 43 elk have died due to

CWD. This compares to 100% mortality in less than 25 months in elk orally inoculated with different dosages of the CWD prion.

6. Epidemiology of CWD: detection, shedding, and environmental contamination.

Thirty elk were orally inoculated with elk CWD prion in May 2005. Every six weeks, elk are individually housed in metabolic cages for three days. Feces, urine, saliva, and blood are collected. These samples are used to develop and validate an assay capable of detecting minute concentrations of the CWD prion in a variety of substrates. Additional samples for testing are collected from insects, rabbits, rodents, and soil where the CWD-infected elk are housed. This study could determine: 1) how the CWD prion is shed from infected animals; 2) the temporal pattern of such shedding; and 3) the degree and extent of environmental contamination with the CWD prion.

COMPONENT III. PUBLIC INFORMATION

Chronic Wasting Disease is of interest locally, nationally and internationally. As the public agency charged with managing CWD in Wyoming's wildlife populations, the WGFD has an obligation to provide timely, complete and accurate information about all facets of the disease to the public in Wyoming and throughout the United States. Ongoing and effective communication is paramount to any plan to manage CWD. It is challenging to provide accurate and up-to-date information regarding this rapidly changing issue. The lack of information available, and the incorrect information being distributed by others, creates an increased need for timely and accurate communication from the WGFD. The public receives mixed messages about this issue. Therefore it is incumbent on the WGFD to provide accurate, unbiased information.

A top priority is effective communication with the general public, constituent groups and the media about CWD. The WGFD will use a variety of communication tools to provide timely, complete, and accurate information about CWD.

1. Messages - The main messages the Department will communicate include the following:

    A. General information about CWD.

    The WGFD will provide general information about the disease, its history, the wildlife it affects, and other basic information.

    B. Management of CWD.

    The WGFD will provide information about the steps it is taking to manage CWD in Wyoming, including surveillance, various activities to slow the spread of the disease and research to understand more about the disease. The WGFD will also provide updated information about where CWD occurs in the state.

    C. Human health issues.

Though there is no evidence that CWD has been transmitted to humans, the WGFD will communicate information to hunters and others provided by disease experts such as the World Health Organization and the Wyoming Department of Health. The WGFD will also provide information on reasonable precautions hunters and others can take when handling game and transporting and disposing of carcasses.

D. Testing.

The WGFD will provide information on how hunters can get their animals tested for CWD.

2. Target Audiences

Target audiences are identified to allow the WFGD to determine the best methods of providing accurate, timely information to interested individuals. The target audience consists of groups and individuals the WGFD believes will be most interested in or potentially impacted by CWD and management of deer, elk and moose herds in Wyoming.

- Those who hunt deer, elk and moose in Wyoming – residents, non-residents, and their families
- Landowners
- Local and national media
- WGFD personnel
- Public health professionals
- Meat processors and taxidermists
- Non-consumptive wildlife users and associated businesses (antler hunters, photographers, license selling agents, landfill operators)
- State and local officials, policy makers, and communities, including WGFD Commissioners, Wyoming Department of Agriculture, the Governors office
- Wyoming Board of Outfitters and Professional Guides, licensed outfitters and professional guides.
- Other state, federal and tribal agencies

3. Objectives

A. Inform target audiences of Wyoming's CWD research, management and regulations as well as the availability of testing.

Inform target audiences of a variety of CWD-related issues using brochures, articles, video, paid advertisements and a variety of other communication tools. This could include presenting information to license selling agents at meetings or through a newsletter, public presentations, displays at events where target audiences will be present, direct mail, putting information on the website and other methods identified throughout this process.

B. Inform hunters, meat processors, taxidermists and others of potential human health issues related to CWD.

Public opinion surveys reveal that human health issues related to CWD are an identified concern among hunters. Many hunters are still unsure about the potential risks of handling carcasses and eating meat from CWD infected animals. Using information from health experts such as the World Health Organization, the Centers for Disease Control and the Wyoming Department of Health, the WGFD will provide accurate information to hunters and others about any potential risks to humans, including meat processing information and recommendations.

C. Maintain and make information available on peer-reviewed scientific studies related to CWD.

Part of the concern about CWD stems from the unknown aspects of this disease. Maintaining information on accepted scientific studies that can be shared with concerned citizens can increase their knowledge level and decrease their concerns. A synopsis of applicable Wyoming studies will be provided to target audiences via the website and other identified methods. A synopsis of studies from other states will be requested, and provided if possible. A link to official research-oriented websites in addition to our current link with the CWD Alliance website will be used to make sure this information is readily available.

D. Clarify the details of this complicated issue by making scientific information user friendly for interested publics.

Many times the scientific jargon associated with a disease makes it difficult for those not working in that specific field to comprehend. Relating accurate information in a format that is easily understood by our target audiences will allow us to better reach our communications goals. The media is trained to put technical information in a form the public can understand. If we want the public to come to the WGFD for accurate, complete, and up-to-date information, we must provide it in a format that is useable. Using layman's terms when publishing articles, doing presentations, and communicating with our constituents can accomplish this objective.

E. Coordinate with other individuals, state, federal and tribal agencies involved in CWD public information efforts.

CWD has been discovered in wild deer, elk and moose populations in other states. Each state is conducting efforts to inform their publics about CWD and the potential effects on wildlife populations. Wyoming, federal and tribal agencies are also involved in some aspects of CWD. Coordinating with other individuals and agencies could prevent the public from getting different messages from different places, further confounding an already complicated issue. The WGFD will participate in multi-agency meetings to share information. We coordinate efforts with other state wildlife agencies through the Association for Conservation Information. We will continue to work with the CWD Alliance to disseminate information and to routinely visit other state websites to monitor what CWD information is available to the public.

F. Provide the media with timely and accurate CWD information.

Providing timely, complete and accurate information lends to the WGFD's credibility and is the mission of most media professionals. Working together to meet the collective goal of providing the public with important information will help build professional relationships. The WGFD will attempt to be the first to publicize any new developments related to CWD. WGFD personnel will also respond to interview requests in a timely fashion. Putting the scientific jargon aside will lead to more accurate news reports. Developing and sharing a consistent message will also be of benefit. Continuing our follow-up on reporting that is not accurate will help media professionals better understand this complicated issue.

COMPONENT IV. FUNDING

Full implementation of this plan will be expensive and will exceed the WGFD's current financial capability.

CWD management, research, and public information activities are expensive, and the WGFD's current financial status will not allow complete implementation of this plan without additional funding. Additional funding specific for CWD will be sought.

ACKNOWLEDGEMENTS

Portions of this plan were liberally copied or patterned after the Colorado Division of Wildlife's "Chronic Wasting Disease in Colorado Deer and Elk: Recommendations for Statewide Monitoring and Experimental Management Planning" by M. W. Miller and R. H. Kahn and the Colorado Wildlife Commission's Policy on Chronic Wasting Disease approved September 13, 2001; we appreciate their generosity and their efforts on CWD. Many elements of this CWD Plan would not be possible without the cooperation of sportsmen, landowners, game meat processors, taxidermists, scientists, and professional wildlife managers; we appreciate their interest and help. Scientists worldwide are conducting research on CWD and other transmissible spongiform encephalopathies that helps to understand CWD and, hopefully, will lead to its future eradication.

Adopted by the Wyoming Game and Fish Commission on February 17, 2006.

Signed: _____
Linda L. Fleming, President

Appendix 4

Alkali Creek Feedground with Corral and Hay Shed

Elk on Feedground

Facilities on Alkali Creek Feedground

Tool Shed

Hay Shed

Feeding Structure

Trash Barrel

Hay Wagon

Hay Sled

Gravel Piles in Hay Barn

Wilderness Boundary

Elk Trails

The following matched photo pairs (Figures 1 through 6) compare the Alkali Creek feedground wetlands in 2007 and 2011. The feedground was visited in September for the initial visit and in July for the more recent one, but conditions did stay moist through most of the summer in 2011. The photo pairs show the wide variability in conditions on the feedground and in the potential wetlands that may exist from year to year.

Southern Wetland in Good Condition, Figures 1 and 2

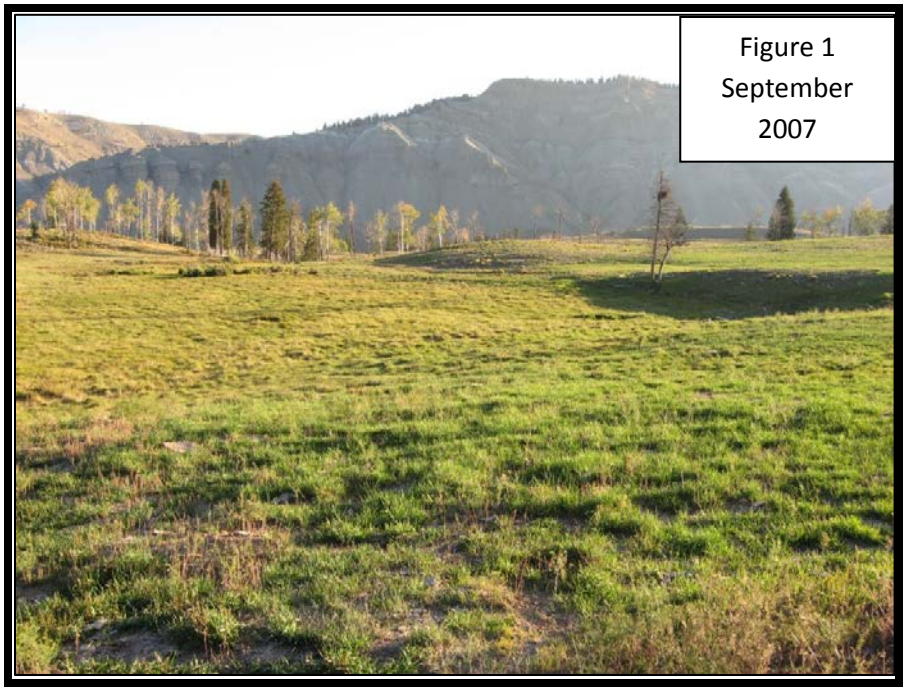

Figure 1
September
2007

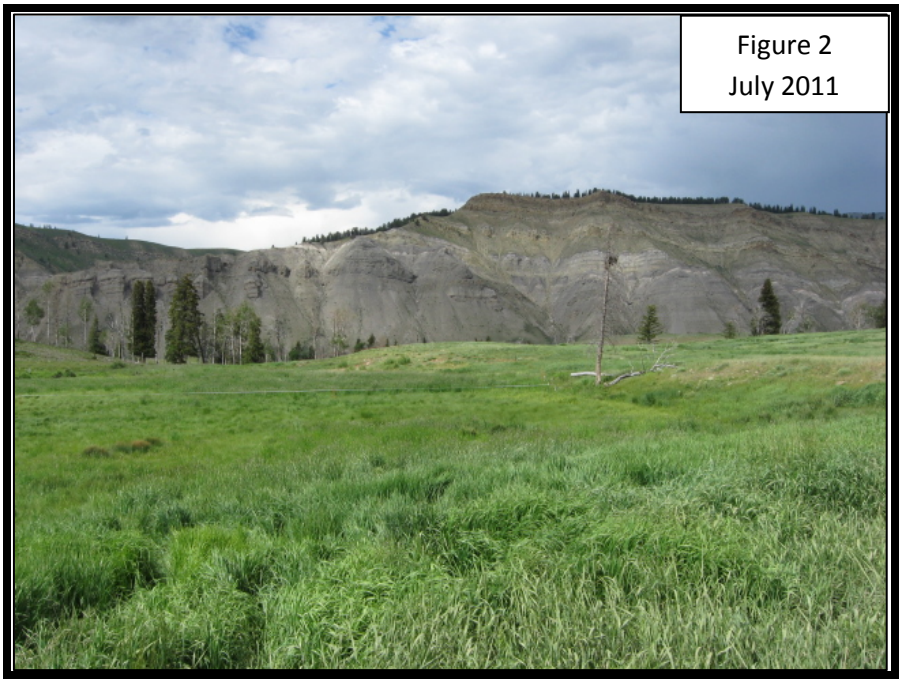

Figure 2
July 2011

Northern Wetland, Figures 3 through 6

In 2011, rushes (*juncus)* were growing in the water along the edge of the northern pond, seen in Figures 3 through 6, and timothy was growing along the outer edge of the pond.

Figure 3
September 2007

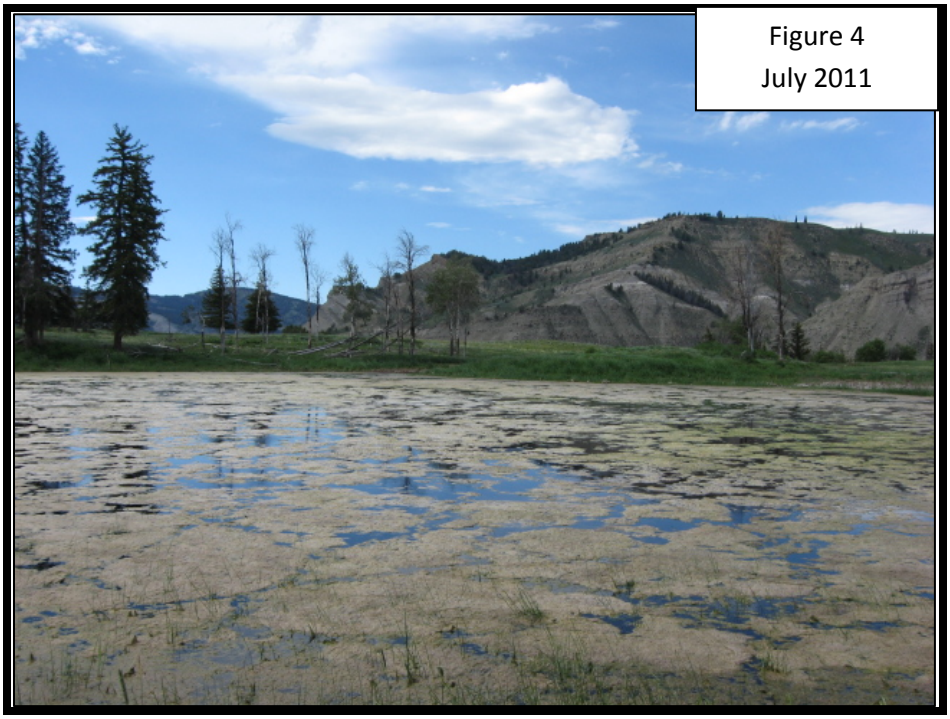

Figure 4
July 2011

Figure 5
September 2007

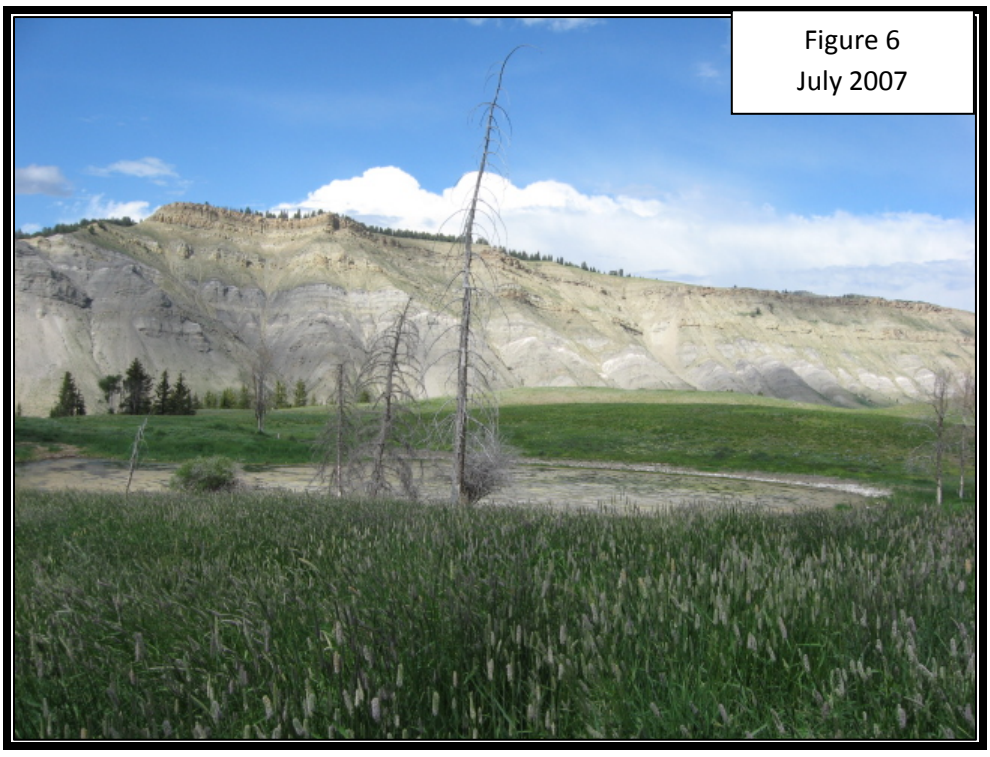

Figure 6
July 2007

Dry Depression

Over-browsed Aspen within Analysis Area

Wilderness boundary

Vegetation/soil impacts from hay wagon or hay sled use

Wet Area within the Feedground

Wet Area within the Feedground

Appendix 5

ALKALI CREEK FEEDGROUND – TABLE OF CUMULATIVE ACTIONS IN THE GROS VENTRE WATERSHED

Type	Time (PAST, PRESENT FUTURE)	Action	Resources Affected						Location		
			Soils	Vegetation	Hydrology	Fish	Wildlife	Wilderness/WSR	Within Permit Area	Within 1 Mile	Within Watershed
Grazing	P/PR/F	Livestock Grazing on the Upper Gros Ventre Allotment	X	X	X	X	X	X	X	X	X
Grazing	P/PR/F	Livestock Grazing on the Big Cow, Lower Slide Lake, Miners Creek, Red Rock Ranch, Redmond Bierer Creek, Robinson Ranch, Taylor, and Winter Range Forage Reserve Allotments	X	X	X	X	X	X			X
Grazing	P/F	Livestock Grazing on the Winter Range Forage Reserve Allotments	X	X	X	X	X	X			X
Livestock Trailing	P/PR/F	Livestock tralling to or from their allotments	X	X	X	X	X			X	X
Elk Trailing	P/PR/F	Elk travelling between feedgrounds on NFS lands and to/from the National Elk Refuge	X	X	X	X	X		X	X	X
Prescribed Fire	P/PR/F	Vegetation alteration, aerial ignition, construction of fire line, and other fire management activity	X	X	X	X	X				X
Wildfire	P/PR/F	Vegetation alteration, aerial ignition and aerial application of fire retardant, construction of fire line, and other fire suppression activity	X	X	X	X	X	X	X	X	X
Roads	P/PR/F	Road maintenance and general public use of existing roads in the watershed from 5/1 thru 12/14 and use by permit during shoulder seasons	X	X	X	X	X		X	X	X
Roads	Past	Gros Ventre River Bridge Reconstruction near Patrol Cabin			X	X					X
Roads	Future	Crystal, Goosewing, and Soda Creek Bridge Reconstruction			X	X					X
Resource Use	P/PR/F	Harvest and removal of firewood, plants, berries, mushrooms, antlers, fish and wild game		X		X	X		X	X	X

ALKALI CREEK FEEDGROUND – TABLE OF CUMULATIVE ACTIONS IN THE GROS VENTRE WATERSHED												
Type	**Time** (PAST, PRESENT FUTURE)	**Action**	**Resources Affected**						**Location**		
			Soils	Vegetation	Hydrology	Fish	Wildlife	Wilderness/WSR	Within Permit Area	Within 1 Mile	Within Watershed
Recreation	P/PR/F	Motorized and non-motorized recreation travel/use and maintenance on system and non-system trails and off-trail travel/use (including antler hunting) from 5/1 to 11/30. Includes Special Use Permitted Activity.	X	X	X	X	X	X	X	X	X
Recreation	P/PR/F	Travel Management Decision limited motorized travel to designated routes from 5/1 thru 11/30.	X	X	X	X	X		X	X	X
Recreation	P/PR/F	Trail grooming and motorized/non-motorized recreation travel/use on system and non-system trails and off-trail travel/use from 12/1 to 4/30. Includes Special Use Permitted Activity.	X	X	X	X	X	X	X	X	X
Recreation	P/PR/F	Picnicking, day use, and camping at designated recreation sites (Gros Ventre Overlook, Atherton Creek, Red Hills, Crystal Creek) and in dispersed areas.	X	X	X	X	X	X	X	X	X
Land Uses	P/PR/F	Permits for private business operation and occupancy on NFS lands (Outfitters, pastures, etc.)	X	X	X	X	X	X		X	X
Land Uses	P/PR/F	Permit for elk feedground at Fish Creek	X	X	X	X	X				X
Pathology	P/PR/F	Tree mortality from insect and disease infestation		X	X	X	X		X	X	X
Invasive Species	P/PR/F	Change in species distribution and abundance due to invasive plants and animals		X		X	X	X	X	X	X
Invasive Species	P/PR/F	Introduction of chemicals or biological control agents to control invasive species	X	X	X	X	X	X	X	X	X
Ag. and Residential	P/PR/F	Agricultural and residential use and livestock (horse and cattle) grazing on private land inholdings and at Patrol Cabin and Goosewing Guard Station. Includes elk feeding at Patrol Cabin.	X	X	X	X	X				X

ALKALI CREEK FEEDGROUND – TABLE OF CUMULATIVE ACTIONS IN THE GROS VENTRE WATERSHED												
Type	**Time** (PAST, PRESENT FUTURE)	**Action**	**Resources Affected**						**Location**		
			Soils	Vegetation	Hydrology	Fish	Wildlife	Wilderness/WSR	Within Permit Area	Within 1 Mile	Within Watershed
Research	P/PR/F	Mountain Lion, Grizzly Bear, Antelope, and Bighorn Sheep research activity					X	X			X
Wildlife	P/PR/F	Reintroduction of wolves and subsequent predation		X			X	X	X	X	X
Wildlife	Past	Wolf delisting and institution of hunting regulations					X	X	X	X	X
Wildlife	Past	Designation of the Pronghorn Migration Route and establishment of forest plan standards					X		X	X	X
Minerals	P/PR/F	Precious metals mining and removal of common materials	X	X	X	X	X				X
Predator Control	P/PR/F	Removal of bears, wolves, coyotes, and other predators					X				

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